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The application of Lean within Higher Education

A methodology for enhancing stakeholder satisfaction with improvement project outcomes

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The application of Lean within Higher Education:

A methodology for enhancing stakeholder satisfaction with improvement project outcomes.

By

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***A thesis submitted in partial fulfilment of the University's
requirements for the Degree of Doctor of Philosophy of Research***

Abstract

The research problem of this work is that in order for an improvement project to be perceived as successful from a stakeholder perspective their requirements would need to be understood at the outset of the improvement project and that where complexity includes multiple stakeholders, with a number of objectives, these would need to be identified and prioritised. In order to provide consistent results and sustained improvement, this action should be an explicit part of the improvement methodology utilised.

The aim of the research is to provide a means of identifying and prioritising stakeholder requirement at the outset of an improvement project, such that in meeting the business needs the resulting outcome provides a 'better fit' solution for all stakeholders.

The research objectives are:

1. To establish a methodology in order to represent all stakeholders to an improvement project;
2. To develop a methodology to determine the importance of the stakeholder requirements and their relative importance;
3. To develop a means of specifying the value desired by each stakeholder;
4. To design and test a methodology that is able to inform an improvement project such that the project outcomes are aligned to stakeholder requirements;
5. To determine the utility of this methodology in improving stakeholder satisfaction with project outcomes.

An investigation into relevant literature, primary field work into the effects of improvement projects, stakeholder involvement, engagement and the capture of stakeholder value, and preliminary research into ten improvement projects across five different UK universities, engaged in the application of Lean thinking to service delivery, was undertaken. This led to the conception of an improvement methodology and the empirical development over three improvement projects resulting in the design of the Voice of [the] Stakeholder (VOS), a directed self-assessment model. End-to-end application of the VOS-Model to the final improvement project of the three demonstrated the validity of the model in identifying stakeholder requirements and value and the alignment of these with the final project outcome.

The wider utility was established through the application of the VOS-model to four further improvement projects. The quantifiable project outcomes in each case demonstrated the utility of the model in the delivery of an improvement solution aligned to business needs, while the qualitative stakeholder feedback confirmed the applicability of the VOS-model in the capture and representation of stakeholder requirement and value.

Glossary of terms

AD	Art and Design
AHP	Analytical Hierarchy Process
AIS	Affected/Interested Stakeholder
AR	Applied Research
ARCBS	Australian Red Cross Blood Service
BDSO	Business Development Support Office
BES	Business School
BOSCARD	Background, Objectives, Scope, Constrains, Assumptions, Reporting, and Deliverables
BP	Business Partner
BPR	Business Process Re-engineering
CI	Continuous Improvement
CTS	Critical To Success
CULC	Coventry University London Campus
CVD	Customer Value Determination
DD	Deputy Director
EFAF	External Funding Approval and Authorisation Form
EFQM	European Foundation for Quality Management's Excellence Model
HAM	Hardware Asset Management
HEFC	Higher Education Funding Council for England
HESA	Higher Education Static Agency
HLS	Health and LIFE Science
HMRC	Her Majesty's Revenue and Customs
HVA	Holistic Value Added
HTS	Highly Trusted Status
IO	International Office
ITAM	Information Technology Asset Management
ITS	Information Technology Service
JISC	Joint Information Systems Committee
KPA	Key Performance Area
LAI	Lean Aerospace Initiative
LAI	Lean Aero-space Initiative
LAT	Leadership Action Team
LD	Local Delivery
LDP	Leadership Development Program

LEU	Learning Enhancement Unit
MBNQA	Malcolm Baldrige National Quality Award
MCDP	Multi-Criteria Decision Analysis
MSIM	Multi Stakeholder Management
PI	Principal Investigator
PO	Planning Office
PPVC	Performance Planning Value Chain
QAA	Quality Assurance Agency for Higher Education
QFD	Quality Function Deployment
RIE	Rapid Improvement Event
RIW	Rapid Improvement Workshop
RO	Registry Office
RPIW	Rapid Process Improvement Week
SAM	Software Asset Management
SDN	Service Dominant Network
SIPOC	Suppliers, Inputs, Process, Outputs, and Customer
SLA	Service Level Agreement
SOP	Standard Operation Procedure
SP	Service Provider
SR	Service Receiver
ST	Sustainable Tourism
TOGAF	The Open Group's Architecture Framework
TPS	Toyota Production System
VOC	Voice of Customer
VOS	Voice of Stakeholder
VSM	Value Stream Mapping

Glossary of Coventry University terms

UNIVERSE	One of the standard University application as the central holding data system
iApply	Support potential student online application
RSN	One of the standard University application holding campus accommodation data
SOLAR	An interface where the students manually input their term-time (TT), Home, and Correspondence address, during online enrolment for national student or post enrolment for international student
QLX	One of the standard University application, holding Financial data

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Introduction

1.1 Origins of the thesis

Under pressure to remain competitive in the face of global competition the manufacturing sector sought ways in which to address the need to improve customer quality and reduce costs. Based upon the concept of JIT and the Toyota Production System (TPS), and as the result of a study of the Japanese manufacturing industry, Lean Manufacturing (LM) emerged as a more effective way for manufacturing organisations to meet customer requirements; for what they wanted, when they wanted it and at a price that they were willing to pay (Womack et al., 1990).

Consisting of a philosophy and a set of principles that focuses on the creation of 'value' for the customer, delivered using tools and techniques that assist in the identification and elimination of waste within the system which leads to the redesign (or design) of the manufacturing system the TPS emerged over some considerable time and as a result of a pragmatic approach to addressing the need for improvement within Toyota's own production environment, an environment best described as low variety repetitive manufacturing (Seddon, 2008). Initially, LM was similarly applied to manufacturing facilities within the automotive sector more globally (Womack et al., 1990).

However, as has already been identified; the origin of TPS (and therefore Lean) is not the result of a theoretical framework but of an approach developed as a result of studying and responding to problems within the (Toyota) organisation itself, work that resulted in a focus on improving the 'flow' of work within the [manufacturing] system not simply on the creation of a set of tools to identify, reduce or eliminate waste. More holistic in nature, it is the application of this system-wide perspective within a culture with a belief and understanding of LM that exposes the wastes within the system that can then subsequently be addressed (Narasimhan et al. 2006). To many within manufacturing, this systems-wide perspective which cuts across functional boundaries has proven to be a challenging concept to apply in practice, requiring more time and scarce resource to implement and deliver tangible benefits (Radnor, 2011). This has resulted in a focus on the application of the tools of LM and the delivery of improvement through their deployment in support of a series of discrete improvement project or events where results and therefore benefit can be secured more

quickly (Morgan, 2006). However, one possible consequence of this identified is that of delivering a sub-optimal outcome that fails to address the root cause (Hines et al., 2007).

While not without its critics (Hines, 2004), the concept of Lean thinking (Lean) has attracted interest from other industries and spheres of activity and examples of the application of Lean principles can now be found within the service sector (Radnor, 2011). Studies have confirmed that Lean is applicable to the service sector and evidence exists that it has been applied in the retail sector, to airline operations, call centre functions, public sector services, and to Healthcare provision and beyond (Garner, 2009).

The lack of widely available reference implementations to see how directly applying Lean tools and practices can work and the lack of a single applicable translation of the traditional techniques and tools of LM into a service context, with relevance than can be more widely appreciated and understood have both been cited as challenges to successful implementation (Radnor, 2011) & (Seddon, 2008). Additionally the report into the use of Lean in the Scottish Public Sector (Radnor et al., 2006) identified a number of commonly reported barriers across all of the organisations studied, posed by people within the organisation, including:

1. manager's (often service heads) lack of ownership by either not fully understanding the processes for which they had responsibility or for not being prepared to look outside their part of the process
2. poor selection of improvement team members with, in some case, the wrong people becoming involved resulting in a lack of understanding of the current situation and future requirements in particular areas of the organisation
3. examples of complaints that not all departments or disciplines are always represented which may result in the knowledge and requirements of some stakeholders being absent from the process and not reflected in the improvement outcome

The same report identified two different models of Lean implementation being utilised. One described as rapid improvement; a "Kaizen Blitz" approach that consisted of rapid improvement events (RIE) that made many small quickly introduced changes. This approach was cited by managers as favourable as it provided a faster return for effort and outcome impact. The other described as a

full implementation (and favoured by consultants) taking a more longitudinal, developmental approach was perceived as delivering a sustained Lean capability.

It is worthy of note however, that in either case improvement events (workshops or projects) were employed as part of the overall methodology.

While some Higher Education Institutes (HEIs) were already engaged at different stages of the Lean journey the release of the Browne report (Snowden, 2014) & (HEFCE, 2012), which outlined the changes in the funding arrangements in English Higher Education (HE) and which coincided with the Comprehensive Spending Review in October 2010 and the significance of these to the HE sector provided additional impetus (Martin, 2012).

A report commissioned and undertaken to analyse the Lean implementation in UK Business Schools and Universities (Radnor & Bucci, 2011) looked at the practice of Lean in HE organisations. The report identified that while not all organisations had started their Lean implementation with an RIE (workshop or project) methodology in each case the institutions involved were using the RIE methodology as the predominant driver to deliver business improvements. Among the important considerations cited within this report was that:

1. more staff needed to be involved in Lean events and follow through on implementation
2. more training and development may be needed on problem solving techniques
3. there are assumptions made regarding customer requirements and that the 'voice of the customer or stakeholder' is not always clearly articulated by direct involvement in Lean improvement
4. there needed to be more evidence to support the quality and timing of information that would result in better processes and more satisfied customers

At around the same time the author along with colleagues was undertaking an approach similar to that being undertaken elsewhere, to the development of Lean at Coventry University (Martin, 2011). Coventry University Business Improvement Training (CUBIT) was an internal initiative, sponsored by the Human Resources (HR) department and led by internal staff with Lean expertise, designed to engage and support staff colleagues from across the university in identifying and delivering improvements. In studying the activities undertaken the conclusion drawn was that the more complex the process or system, where functional boundaries and multiple stakeholders were involved, the greater the likelihood that all of the relevant stakeholders would not be fully engaged, that their requirements would not be appropriately understood and this could lead to a sub-optimal outcome for the project.

The research evolved around the question of 'How Lean is implemented in HE' at the inception. An extensive review of literature related to Lean, Service improvement, and Stakeholder management motivated and justified the 'Research Problem' statement:

That “in order for an improvement project to be perceived as successful from a stakeholder perspective their requirements would need to be understood at the outset of the improvement project and that where complexity includes multiple stakeholders, with a number of objectives, these would need to be identified and prioritised. In order to provide consistent results and sustained improvement, this action should be an explicit part of the improvement methodology utilised”.

While the co-production of service is inevitable as the production of the service cannot be disconnected from the stakeholders the co-creation of value within improvement projects (within HE), in order to better inform and guide management of improvement projects, is the unique input from the research perspective.

In order to critically review and critique the existing model, framework, and approaches towards service improvement, a framework as a 'diagnostic questions' was proposed:

1. Have all the stakeholders been represented at the outset of the improvement projects?
2. Has a formal process to capture and determine all stakeholders' requirement been used?
3. Have the stakeholders' expectation been quantified, prioritised and balanced to streamline the value flow in a structured manner?
4. Have the defined balanced requirements been used to guide optimisation of service effectiveness?

These four diagnostic questions were designed based on the root definition of relevant concern raised from literature review as the gap. Meanwhile in response to the diagnostic questions, the research problem has been divided to sub-research problem in order to make more manageable steps towards development of the model.

The four sub-research problems are:

- H1.1 Represent all the stakeholders at the outset of the improvement project
- H1.2 Establish a formal process to capture and elicit all the stakeholder expectations
- H1.3 A formal process to quantify, prioritise and balance the stakeholders' expectation in order to streamline the value flow in a structured manner
- H1.4 The defined balanced requirements to be used to guide optimisation of service effectiveness to ensure meeting the existing and emerging needs

Diagnostic questions, and a Sub-research problem were used to compare and review the 8 Lean implementation models in HE (desk research), 5 Stakeholder management models (desk research), and 10 Lean implementation cases in HE (primary research). The result reinforced the research aim and objectives.

1.2 Aim of the research

The research aim is “to provide a means of identifying and prioritising stakeholder requirements at the outset of an improvement project, such that, in meeting the business needs the resulting outcome provides a ‘better fit’ solution for all stakeholders”.

1.3 Research Objectives

From the aim the following objectives were defined:

1. to establish a methodology in order to represent all stakeholders to an improvement project
2. to develop a methodology to determine the importance of the stakeholder requirements and their relative importance
3. to develop a means of specifying the value desired by each stakeholder
4. to design and test a methodology that is able to inform an improvement project such that the project outcomes are aligned to stakeholder requirements
5. to determine the utility of this methodology in improving stakeholder satisfaction with project outcomes.

The outcome of this research in addition to typical successful Lean application has:

- The benefit of evaluating whether there is sufficient justification to proceed with the project early on, providing the baseline for decision-making process required during the project's life, and checking whether the improvement is on the right track towards effectiveness, for project boards.
- The benefit of reduction of any rework or reactive improvement and the cost associated with them for organisations. This is by guiding the organisations to address the steps that are designed to concentrate resources, on identifying the importance of stakeholder requirements for achieving a project result that will ensure real improvement for all stakeholders in the outcome.
- The benefit of value co-creation in improvement projects (within HE) to better inform and guide project leaders or improvement practitioners. This would provide the improvement practitioners with clear expectations and less ambiguity regarding value definition. To facilitate delivery of project objectives and mitigate resistance to change within the initiation stage and throughout the project, providing a clear insight to value and a chance to review the improvement against the defined value.
- The benefit of representation of all stakeholders at the outset of the improvement project with establishing formal processes to capture and elicit all the expectations. This provides stakeholders with the opportunity to raise issues and suggestions to manage attention towards effective service improvement. This facilitates communication, delivery of a wider improvement, and visibility within organisations by offering the required control to stakeholders and articulating the views. Communicating existing and emerging expectations will help the development of solutions, while ensuring a firm and accepted foundation to the project from stakeholders prior to commencement of the work.
- The benefit of offering an extensive review of literature related to Lean, Service improvement, and Stakeholder management as the main topic of research investigation for the academic community. In addition to proposing a framework for the critique of existing models, frameworks and approaches towards service improvement, devising a research methodology, and designing the VOS-model to specify value desired by multi-stakeholder within the HE service with simplifying the complexity without the loss of fidelity.

1.4 Research methods employed

The research methods employed were:

1. Desk research of published literature to establish the state of current knowledge about Lean application in HE service and managing expectations, and identifying potential alternatives for achieving the stated objectives
2. Structured & Semi-structured interviews with Cardiff, St Andrews, Leicester, Portsmouth, and Coventry University to understand the opportunities and constraints in the area of discourse
3. Action research within an ongoing improvement projects to gather data to facilitate the development of approaches of the stated problem
4. The development, application, testing and refinement of an analysed framework to determine the practicality and utility of the solution.

1.5 Structure of the thesis

Having introduced the research in this chapter, Chapter 2 surveys relevant literature to determine the direction and means to achieve the research objectives. Chapter 3 demonstrates the rigour of the research process by going through the research strategy and research design, and methods employed. Chapter 4 collects observation cases to inform basis for a survey to evaluate the gap highlighted in the literature review, by in depth interview of Cardiff University, St Andrews University, Portsmouth University, Leicester University, and Coventry University. Chapter 5 builds up an analysis and discussion based on all the case studies in chapter 4, with the aim of investigating how the value is assessed and used in HE Service, in an improvement project, with specifically focusing on whether the stakeholder definition of value is incorporated into project.

Chapter 6 details the research problem, the research environment and develops the framework which covers the model development while validate each intervention through an iterative cycle. Chapter 7 covers the developed model impact and utility validation on five different improvement projects. Chapter 8 discuss the relevance of the requirement for all stakeholders to be included in the process of improvement and that recognising and addressing their requirements is important to project success and through an appraisal of the case-study improvement projects, identify the utility of the VOS-model and thus demonstrate the degree to which the application or use of this can be considered generic. In the chapter 9, conclusion will be drawn. In the final chapter; - chapter 10, further related research will be mentioned.

Literature Review

Lean is a production practice that aims to minimise waste along entire value stream that has been applied mainly in manufacturing but which is also applied in non-manufacturing areas. However, tensions arise when trying to apply Lean principles to intangible products (service) thus, the literature review starts with a general review of the definition and explores the difference between Service based and Product based industries, and more particularly compares and analyses HE Service position and its character.

Then literature that will be reviewed are the ones related to management models drawn from the manufacturing sector to HE, followed by the detailed research on the Lean philosophy improvement, and the evaluation of Lean thinking into service. This will review the Lean thinking and its application in meeting customer requirements while aiming to retain competitive advantage.

To reflect where some of the gaps are within the literature, and knowledge around service improvement, the Lean implementation in the Service Industry and specifically the review of implementation in Call centre, Health sector, Service process within manufacturing, Public sector, and Universities is covered. In addition this was done in order to understand the applicability and benefit realisation.

The reviews raised the need to study the available methods and definition on stakeholder value identification, in order to understand why the service is in place from a stakeholder perspective. To investigate the gap further a review of current available models and frameworks in public domain for implementing Lean in HE improvement project is covered.

At the end of the chapter, it is discussed and specifically mentioned the gap in the literature and knowledge. And in summary draw a conclusion on success and shortcoming of the current approach and methodologies in use in public sector and specifically in HE Service.

The topics covered in Literature review are: Service and product based industries, Management methods, Lean philosophy progress, Lean thinking, Customer value, Lean implementation in Service industry and importance of customer value identification, Stakeholder value identification, and the review of the available models and frameworks for Lean implementation in HE.

The approach taken to the research was started as 'Systematic' by trying to find all relevant material in the area of discourse, and 'Citation' by following up references from useful articles, books and reading lists. The source were mainly books and journal articles, while some of other sources related to the subject such as government report, or statistical information has been used as well.

The main area of the research and the keywords used in each area were as follow;

- **Lean;** Principles, Manufacturing (production), thinking, toolbox, system thinking, Evaluation, implementation analysis;
- **Value;** definition, proposition (constellation), customer value, stakeholder value, assessment, recognition, shareholder value, value in service, mapping value, value stream map, problem solving map, co-creation (co-production), maximisation;
- **Stakeholder;** theory, management, identification, analysis, relationship, engagement, approach, governance, attributes, expectation, satisfaction;
- **Lean in Service;** NHS (Healthcare, hospital), Education, Higher Education(University), Public sector service, framework, Aerospace, beyond Lean manufacturing, limits of Lean, Lean transformation, Business management, Lean Six-Sigma, Lean business system;
- **Management methodologies;** in service organisation, Education, improving performance, increasing performance, operation management, strategic management, managing decision making (uncertainty), project, competitive advantage, manufacturing management, sustainability, sustainable university, process improvement, effectiveness, business excellence, holistic, measure performance;
- **Customer;** quality, analysis, measure customer value, intension, interaction, Kano, satisfaction, demand management, voice of customer;
- **Service;** Lean, organisation structure, organisation process, organisation behaviour, differentiation with manufacturing, management, QFD, industry, manage service demand, public service;
- **HE;** reform, improvement, funding, efficiency, academic discipline, economy.

2.1 Service and product based industries

Despite the extraordinary growth of the service sector and its pivotal role in the global economy, the level of productivity in this sector has been much lower than that of the manufacturing area (Resta et al., 2015). Whereas manufacturing organisations achieve their primary purpose through the production of products, service organisation accomplish their primary purpose through the production of services, such as education, health care, transportation, banking, and hospitality (Daft, 2007). In Service industry customer is part of the production process. Based on marketing

management, the relationship within the service can be overviewed as a network. Previously it was categorized as a network of Business to Business (B2B), Business to Customer (B2C), and Customer to Customer (C2C), however, in service-dominant network (SDN) logic, Vargo and Lusch (2011) refer to actors instead of suppliers and producer or customer or users and propose that actors integrate resources to enable services. In networks, actors are also inter-actors who might be active or passive (Lobler, 2013). Regardless of being active or passive, or the term used to refer to stakeholders, the interaction of customer/stakeholder is necessary to create the service.

As an economy evolves from a primarily agrarian society to an industrial society, the emphasis evolves as different types of services emerge (Heineke & Davis, 2007). While the transaction around the world is happening in different levels, Heineke & Davis (2007) has classified the change to consistent stages:

- Infrastructure services; this is the early stage of the transaction, in which the focus is primarily on infrastructure services in the form of transportation, government services, healthcare, and communication services;
- Support services; such as banking, insurance, retail operation, restaurant and hotels for business travellers and improving healthcare service (Chandler, 1977);
- Recreational and leisure services; following to the growth of manufacturing and in result the salaries, people tend to spend their income for recreation and leisure;
- Education services; Higher education is important in any discussion of services, not only because it is itself a service, but also because as the service sector expands into other modern services demand increasing levels of literacy and numeracy in their employees (Heineke & Davis, 2007);
- Time saving services; in the society where the people are required to work longer hours to be able to sustain the standard of living, time plays a critical role in any one's life. Services such as online-shopping, and childcare;
- The service experience; is where the customer sees added value in service experiences; such as Disney World, Rain Forest Café, Universal Studios, and hair salons offering aromatherapy (Heineke & Davis, 2007)
- Information services; many firms have expanded their service offering by providing information that assists customers with decision-making, such as Amazon.com provides customers with a list of other books that have been purchased by people who have purchased the book the customer wants to buy (Heineke & Davis, 2007).

In general based on the manufacturing and service characteristics as shown in table 2.1, differences between Service and Produce based industries can be categorised as:

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Table 2.1 Differences between Manufacturing and Service (Reichheld, 1990 & Bowen, 1989)

Although the boundaries between product and services are becoming increasingly blurred, with many manufacturers offering services in support of their products (Heineke & Davis, 2007), the most obvious difference is that service industry produces an intangible output, it is abstract and consists of knowledge and ideas, the production of the intangible product happens simultaneously with its consumption, and the product does not exist till it is requested by customer. As the service is requested by customers, the employees are obliged to meet their needs and provide them with the service, which makes the system labour-and knowledge intensive. The direct interaction between the service receiver and the service provider makes the human elements extremely important. The quality is perceived which means cannot be measured in service; however, this can be argued when the level of customer satisfaction is considered as a method for measuring the service quality. But the difference is in product-based manufacturing, as the product gets measured against a clear specification, and methods like six-sigma or other quality approval measures can be used before delivering the tangible product. In service, the service level agreement (SLA) can be used for delivering the service; however, when it comes to intangible products and when SLA is not in place, the service is left to be quality measured after the delivery, through methods like surveys, and customer feedback.

The main measures in place to measure HE progress and action are:

1. KPI's and strategies, based on corporate plan which indicate the control over the progress is more strategic-based
2. QAA (Quality Assurance Agency) which, despite any other quality measures is in description report format

While KPI's covers the strategic aspect of HE and QAA the academic, there is no measure in place but the post-service delivery student survey done annually. Most organisations are focused around KPI's such as Budget, Incentives, Costs and Skill development, while process based management adds these performance measures, but in an operational way. In particular, management by process is selected because there is a need to link:

- All the activities in order to pursue a unified objective, i.e. customer satisfaction in all its aspects (Schonberger, 1990)
- The overall performance (especially non-cost performance, such as quality, timelines, and flexibility) result from an integration and coordination of activities. (Harrington, 1991)

Since 19th century, schools in England started to measure the education quality based on Accountability in Education, which refers to the practice of holding educational system responsibilities for the quality of their products-students' knowledge, skills, and behaviours. The accountability in education has elements of:

- Market-base accountability; education trying to maintain a competitive advantage by improving their public image, and introducing more choices, while they are kept accountable of academic standards. Not being able to meet the goals, they will lose students, which leads to the loss of revenue and economic failure.
- Performance-based accountability; this is school being accountable to government for raising student proficiency which is measured by standardised tests.
- Professional accountability (Stecher, 2004); teachers being accountable to professional peers and organisations for recognising professional practises.

The service needs to be served in a timely manner and geographically close to the customers. Part of this matter has been solved through the use of technology in HE by putting information on the websites for users which means the representatives have more time to deal with more complex questions. The technology information systems have been used as a tool for exchanging information between customer and HE as a communication channel. By comparing the organisational structure of HE (service) and Manufacturing organisation as shown in table 2.2, it is realized that:

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Table 2.2 Configuration and structural Characteristics of Service organisations versus Product organisations (Daft, 2007)

Boundary roles are used in manufacturing system to handle the extent of variation and control the technical part of production, nevertheless it is a different scenario in HE, as the service is intangible and cannot be passed to the customer within boundaries. That is why the service customers must interact directly with skilled employees. These employees need enough knowledge and awareness to handle customers' problems, i.e. social and interpersonal skills as well as technical skills (Northcraft, 1985). Because of the required higher skills for providing service, most of the time decisions making is decentralized and the formalization is lower.

Charles Perrow (1967) developed a framework which specified the two dimensions of any organisational activities:

1. Variety; task variety concerns whether work processes are performed the same way every time or differ from time to time as employees transform the organisation's inputs into outputs.
2. Analysability; problem solving can involve the use of standard procedures, such as instructions and manuals, or technical knowledge such as textbooks or hand outs. On the other hand, some work is not analysable, which means the solution to a problem is not clear so employees rely on accumulated experience, and judgment. Therefore the final solution is the result of wisdom and experience, and not standardized procedure.

In reality, most of the varieties in the process develop due to not having standardized process in place, or reinventing the wheel every time. In HE the variety of processes can be hugely removed by removing duplication and put the standardised process in place. Based on Perrow's framework HE main activities can be categorised as bellow;

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Table 2.3 Categorisation of HE main activities (Perrow, 1967)

The variety within the system can be compared from other aspects as well. Systems can be divided into:

- **Conventional:** Stable in terms of producing high volumes of output of limited variety
- **Unconventional:** great deal of variety

Within this categorisation of the UK University, as shown in table 2.4, based on Hines (2008) research is an unconventional system. The university, although deals with a large number of students, each student has a distinctive route through the system via the vast range of different courses delivered by numerous individual schools and centres. Meanwhile, likewise any other service that the HE Service requests traffic can be predicted only to some extent, however HE is responsible to provide the service as and when it is requested by the customer within the promised time frame.

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Table 2.4 Conventional and unconventional organisation comparison
(Bateman, 2007)

As Bateman highlighted, one of the main differences between HE and Conventional organisation, for example manufacturing, is dealing with multiple customers and stakeholders. While this is a challenge to overcome, not knowing who the customer is for each service and poor customer focus add up to the complexity.

One approach to deal with the situation can be like the one by Bateman, which is to accept the current situation of HE as their characteristic and look for methods to improve the situation. Recommended and used solutions are implemented Centralization and Agile method.

HE is currently an Open system which got vertical structure and unconventional characteristics. The HE organisation based on impact from the environment changed from:

- Complex, Stable = Low, Moderate Uncertainty to
- Complex, Unstable= High Uncertainty

It can be discussed that, vertical structure does not fit for purpose anymore, specifically for carrying forward the need for change and improvement, as Hines (2010) presented the policy deployment to align and engage everyone with the goals of the business will be a challenge in vertical structure. Daft (2008), emphasises the organisations with high uncertainty generally need to have a horizontal structure which encourages the cross-functional communication and collaboration. On the other hand instead of being functional based it needs to become process based so that the boundaries between departments can be reduced. Radnor (2010) emphasises “there is a need to remember processes are dynamic and usually across boundaries so the ability to understand them is not easy”.

The universities typical processes can be categorised as:

- Admitting students
- Hiring faculty
- Moving students into the residence halls
- Purchasing supplies or services
- Adding or dropping a course
- Establishing a partnership with an international institution to support education abroad
- Remodelling laboratory space for faculty research
- Reserving a classroom
- Providing medical or mental health services
- Offering a new course or major
- Approving a grant submission
- Advising students
- Preparing mandated reports to state or federal agencies
- Reimbursing professional travel
- Communicating with donors
- Scheduling instructors for summer courses (Balzer, 2010).

However, the discussion on whether the HE needs to be Process, Strategy or Customer-based is a challenge to overcome. It should be beard in mind that by being process-based rather than functional-based it is meant that there is a system and an End-to-End process view by a focus on stakeholders and mainly end-customer as the ultimate value is defined by them. As the scope of the research does not cover the HE organisation structure change, the knowledge on specific characteristic of HE organisation will be used to have a better understanding of HE and to develop the framework.

One of the major differences between managing education and other industrial environments is that manufacturing industry is more plan-based and less policy-based whereas, education is more policy-based than plan-based. In education, it is dealt with skilled and educated people across the University, whereas in manufacturing the level of skills is mostly limited to the product range they are producing. For this reason, in current years policy management (Hoshin Kanri) has been gradually started to be used especially in Lean improvement in HE. The main thought behind the Hoshin Kanri is that each person is an expert in his/her job, therefore delegation plays an important role.

Regardless of the type of industry e.g. manufacturing or service, business models can be classified through their value creation:

- Value Chains,
- Value shops and
- Value Network (Ballou et al, 2004)

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Table 2.5 Types of Business Models: Value Chain, Shops and Network (Ballou et al, 2004)

Lean manufacturing was developed based on Value chain business (i.e. Toyota), which produced tangible products. While it can be discussed that HE Service will fit in the value chain business, with intangible product, there will be areas such as an end result, and source of value which requires close attention to accommodate the difference. Therefore, confirming the applicability requires a further investigation in literature on cases Lean philosophy has been applied to, which will be reviewed in the following sections in more details.

Now that the organisational and business characteristic of HE Service in comparison with other organisations i.e. manufacturing has been reviewed, it can be progressed into ways to manage.

2.2 Management methods

200 years ago, the emerging industries were revolutionised with the invention of steam power and mechanised equipment. They provided a rise in productivity compared to the previous cottage industry. At the turn of this century and continuing to the present day, the principles of scientific management have been developed to make the application of this workforce more effective.

Among industries, manufacturing industry has progressed through the phases of:

1. Industrialization
2. Mechanization
3. Automation (computerization)
4. Integration (linking) (Parrish, 1990)

Piercy (2012), explains the progression as cottage or craft-based activity into industrial organisation and now into the post-industrial economy. Piercy (2012) notes that, 'While specific tools and technologies evolve over time, the broader strategic lessons are constant across history, i.e. what keep changing are the answers, and not the questions'. The main aim of the progression was to utilise the factory by elimination of bottlenecks. Since the 19th century the industrial revolution has happened based on the distribution of data. This showed, the huge gap between the west and the rest is now closed and it has become entirely new converging world. In this new global market world, the scientific management started to work on wider subjects such as sharing best practice, utilization of staff, holistic system thinking, system design, value, and process thinking, for a more successful organisation. Industry is a generic description, covering several activities which adds value to a "product" or provide a "service". Industry can be categorized into:

1. Service
2. Process and
3. Manufacturing (Parrish, 1990, Johansson and Olhager, 2006)

Public sector organisations over the past few years experienced a rise in focus of the use of business performance improvement methodologies (Radnor, 2010b), that are commonly associated with private enterprise and manufacturing (Radnor et al, 2012). There has been literature with evidence of the transfer of manufacturing concepts to the service sector since 1970s arguing that service characteristics are not an excuse for avoiding manufacturing methodologies (Bowen and Youngdahl, 1998; Radnor and Bucci, 2011) as a means of performance improvement. Business process improvement methodologies are based on established tools and techniques, and therefore as Radnor et al.(2006) argues, they draw on 'any good practice of process/operations improvement that allows reduction of waste, improvement of flow and better concept of customer and process view'.

Lean thinking, Six Sigma, Business Process Re-engineering (BPR), Total Quality Management (TQM), ISO9000, The European Foundation for Quality Management's Excellence Model (EFQM), The Malcolm Baldrige National Quality Award Program (MBNQA), Kaizen and Benchmarking have been used in manufacturing for several years and are currently starting to be applied in service and public sector organisations.

TQM can be defined as an 'evolving system of practices, tool and training methods for managing companies to provide customers satisfaction in a rapidly changing environment' (Anderson et al., 2006). As Radnor (2010) in her research summarised, 'The notion of total quality management was introduced by Feigenbaum in 1957 whose book 'Total Quality Control' was taken on board and utilised by the Japanese. Other quality 'gurus' have included; W.E. Deming who developed the '14 points for quality improvement', Juran who introduced the phrase 'fitness for use', Ishikawa who created 'Quality Circles' as a tool by which worker could participate, Taguchi who focused on the design and engineering-in of quality and, Crosby who implemented the concept of Cost of Quality'.

The EFQM model contains of nine criteria, five of which are 'Enablers' and the other four are 'Results'. The Enablers criteria covers what an organisation does, and the Result criteria covers what an organisation achieves (EFQM, 2003) & (George et al., 2003). Excellent results with respect to Performance, Customers, People and Society are achieved through Leadership driving Policy and Strategy, People, Partnerships, Resources, and Processes (EFQM, 2003).

ISO9000 is a family of standards for quality management systems and is administered by accreditation and certification bodies. The purpose of ISO9000 is to reduce defects through codification, audit and documentation of process standards, which requires assistance from external experts (Baczewski, 2005: Radnor, 2010).

Kaizen or ‘continuous improvement’ is an ‘organisations continual push for obtaining efficiency gains in quality and performance in the value of product/service delivered to customers’ (Cusumano, 1994).

Radnor (2010) explains, ‘Benchmarking looks at the differences between companies and determines the causes of the differences. Looking outside the organisation and sharing information on how other improvement projects are structured and undertaken provides insight into how effective project deployments have been and what could be done to improve them.’

The evidence in review of business improvement methodologies by Radnor (2010), indicates BPR, TQM, Benchmarking and Kaizen have been superseded as a process improvement methodology by approaches such as Lean.

As a result MBNQA, EFQM and Lean the methodologies which have been drawn from the manufacturing sector and been spreading to service industries got reviewed further in details.

a) The Malcolm Baldrige National Quality Award Program (MBNQA)

The goal of Malcolm Baldrige National Quality Act of 1987 is “to establish criteria for performance excellence and to provide organizations a framework for designing, implementing, and assessing a process for managing all business operations to be able to meet those criteria”(Stecher, 2004). The method is widely accepted in the United States both in manufacturing and business as well as the potentiality to explore for lessons that might be applicable to the education sector. The MBNQA business framework is focused in seven main criteria which in 1999 got extended to education and health sectors. The framework criteria stayed the same except in three areas, where changes applied to fit the new sector.

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Table 2.6 MBNQA transformation from Business to Education and Healthcare (Stecher, 2004)

The changes applied to fit the HE sector, were in three main areas of Student/stakeholders focus, Faculty and staff focus and organisation performance measures in place.

For Education, the Baldrige criterion of excellence in organisational performance was translated into “value-added” demonstrated performance as measured by:

1. Annual improvement in key measures of performance (KPI's), especially student learning and
2. Demonstrated leadership in performance and performance improvement (Stecher, 2004).

The reason behind using the value added concept is to put attention on teaching and learning strategies, regardless of student's level and abilities prepare a situation for an organisation to go through the same challenges like any other educational organization, and make the opportunity to introduce the successful teaching and learning practice as best practice.

MBNQA refers to the ways by which the 'key process' can be managed more efficiently to create students and stakeholder value maximized, while investigating how the KPI and support process, such as finance, facilities, information service and human resource, are used to improve key processes.

MBNQA has been designed and applied to schools, not HE. HE has two more areas; Research and Service, which make the organisation more complex. The research section itself, as mentioned (table 2.3), has high variability with low analysability, which makes it hard to measure based on MBNQA criteria totally. Even though the MBNQA is not designed for HE, both schools and HE are knowledge-based systems and have the same basic characteristics, i.e. intangible outcomes and multiple stakeholders.

b) The European Foundation for Quality Management's Excellence Model (EFQM)

The fundamental concepts which underpin the EFQM model based on Porter and Tanner (1996) and EFQM (2014) are:

- Result orientation; Excellence is achieving results that delight all the organisation's stakeholders
- Customer focus; Excellence is creating sustainable customer value.
- Leadership and Constancy of purpose; Excellence is visionary and inspirational leadership, coupled with constancy of purpose.
- Management by processes and Facts; Excellence is managing the organisation through a set of interdependent and interrelated systems, process and facts.
- People development and Involvement; Excellence is maximising the contribution of employees through their development and involvement.
- Continuous Learning, Innovation and Improvement; Excellence is challenging the status quo and effecting change by using learning to create innovation and improvement opportunities.
- Partnership Development; Excellence is developing and maintaining value -adding partnerships.

- Corporate Social Responsibility; Excellence is exceeding the minimum regulatory framework in which the organisation operates and to strive to understand and respond to the expectations of their stakeholders in society.

Kanji and Tambi (2002) consider the EFQM Excellence Model to be the special type of TQM models that provides measures of key organisational areas and their overall performance.

Based on the survey conducted by Kanji and Tambi (2002) to 163 UK universities and higher education colleges, it was found that only 4 institutions had implemented TQM, while Commons (2003) confirms few colleges have embraced the EFQM formally. This is when Stawicki's (1999) opinion is that it seems to be too difficult to implement TQM in a department or in a complete university. Raisbeck (2001) identifies a culture of openness and co-operation as one of the fundamentals for the implementation of the EFQM Excellence Model. Therefore, prior to any improvement with HE, cultural change towards environment of co-operation and support would be required.

c) Toyota Production System (TPS)

The Toyota Production System (TPS) is the unique manufacturing system pioneered by Eiji Toyoda and Taiichi Ohno at the Toyota Motor Company in Japan after World War II. TPS is synonymous with "Lean production" or "Lean manufacturing," a term coined by researchers in the International Motor Vehicle Program at the Massachusetts Institute of Technology (MIT) (Womack et al., 1990). Across all the modern and available management strategies, "Lean" has been shining since 1991. The Lean philosophy goes back to the first person who integrated the production process in manufacturing; Henry Ford. In 1913 he produced moving conveyance to create what he called "flow production". However, when the world required variety seems Ford lost the track to keep up with the competition. By Henry Ford's empowerment of people to improve the processes they perform, and the principles of creating a world class organisation through continuous improvement developed by quality expert W. Edward Deming, Toyota recognised the implications and applied the collective genius of these processors to its small manufacturing and then it refined and expanded its process-improvement through waste-elimination focus to include enterprise wide operation (Ziskovsky, 2007). The idea progressed from improving the utilization of a single machine to flow of the product through the total process. By doing so, they realized it would be possible to obtain low cost, high quality and rapid throughput times to respond to customer need. Lean is considered to be a radical alternative to the traditional method of mass production and batching principles for optimal efficiency, quality, speed and cost (Holweg, 2007).

'Mankind invented management, therefore mankind could re-invent it' (Zokaei et al, 2011), Deming's work was included a scathing and detailed critique of the Western management assumption. The main target of criticism were use of arbitrary measures to govern the way work is managed, the management of separated functions independently within an organisation and the separation of decision making from the worker, he argued the need to understand managing organisations as a system (Zakaei, 2010). Lean has been developed over time (Womak, 1996), with five core principles based on the fact that each system is an organisation and the organisation is made up of processes (Womak 1996a, Porter and Baker 2005).

Lean thinking principles have been classified to (Womack et al., 1990):

1. **Value:** specifies the value desired by the customer
2. **Value-stream:** Identifies the value-stream for each product or process, providing the value, and challenge all of the waste steps currently necessary to provide it
3. **Flow:** makes the product flow through the remaining value-added steps. Standardisation around best practice allows work to run more smoothly, freeing up time for creativity and innovation (Radnor, 2011). While billions have been saved through implementing flow processes across many industries, engaging people and sustaining improvements remain enormous challenges for managers (Zakaei, 2010).
4. **Pull:** introduce pull between all the steps where the continuous flow is possible in this way inventory and human activity is linked to customer need.
5. **Perfection:** manage through perfection, so that the number of steps and the amount of time and information needed to serve the customer continually fall

Much success has been achieved in high volume manufacture, by going through the 5 steps, step 1 and 2 eliminate the wasteful activities from the shop-floor and are supported by improved consistency through the application of Lean tools such as standard operation, 5S, housekeeping and increase quality (Moradi et al, 2010). The approach behind the tool is the Lean manufacturing transformation starting point should be from strategic level so that its impact throughout the enterprise will be profound and affects all the business processes. However this wider approach sometimes gets alternated by running Rapid Improvement Events (RIE) as an improvement projects (Radnor, 2010b; Manos, 2007). While both approaches use RIE projects as a predominant driver to deliver business improvement (Radnor et al, 2006; Radnor and Walley, 2008).

Manufacturing is Lean if it is accomplished with minimal waste due to unneeded operations, inefficient operations, or excessive buffering in operations (Narasimhan et al. 2006) and due to its

success became of widespread use within the manufacturing platform. Some of the benefits of the application of Lean manufacturing will be in the form of higher quality product at a lower cost, stable working environment and better utilisation of resources (Martin, 2012). While manufacturing companies recognise the benefits, they realise there are different ways to do it. Adoption of Lean manufacturing throughout the world and in different types of manufacturing industries is with the aim of achieving competitive advantage in the global marketplace. Having the main focus of Lean manufacturing on elimination of waste or 'Muda', companies tend to look for a quick fix for working more efficiently through the use of Lean manufacturing tools, external consultant, or training and rapid improvement events, rather than embedding the philosophy within the organisation. Within the manufacturing, initially Lean has been implemented by high volume, repetitive manufacturing, resulting the elimination of waste in two main areas (Moradi et al, 2010):

- Manufacturing process improvements, typically single piece flow and right first time, and
- Production control improvements, typically visual Kanban (pull type) control systems.

However, the production control system can fit for purpose only if it can reply to the needs of the company's characteristic and the business environment within which it works. Therefore, by moving away from high volume manufacturing to low volume with high variety, it is required to be more creative for implementing Lean philosophy. For instance, the step 3 in Lean manufacturing (i.e. Flow), in high volume manufacturing environment is typically achieved by adoption of single piece flow cells, as by doing so it will be easier to justify the dedication of machine and resource, whereas in low volume this would not work. Putting all the product in one production line it is critical to control the harmonious movement of the parts and to do so takt time is used by Ohno, where as in the environment with high variety it is required to design a system that accommodate the variety. It can be inferred that the 'Lean' Kanban (pull) system is not the only solution for all types of manufacturing companies, while the underlying principles of Kanban (pull) systems which make it successful- simple, visual, empowering - should be included in any adapted design (Moradi et al,2010).

The intention of using Lean philosophy outside of high repetitive manufacturing environment, introduced the Lean thinking as a new approach to Lean philosophy. The Lean thinking being practiced widely across in many industry sectors both as a 'way of doing things' and an 'improvement methodology', delivering significant tangible and non-tangible benefits. (Garner, 2009). As Lean thinking continues to spread in the world, leaders are also adapting the tools and principles beyond manufacturing, in sectors such as:

- Logistics and distribution,
- Services,

- Retail,
- Health care,
- Construction, maintenance, and
- Even Public sector organisation

Some commentators have declared Lean is “the paradigm for operation and its influence can be found in a wide range of manufacturing and service strategies” (Lewis, 2000), So far the service industries including banking, law enforcement, insurance, uniformed services, city and state government agencies, service bureaus, and most recently Healthcare and HE. While, the subject has been taught and researched within the school widely in manufacturing, health and supply chain sector, the implementation of Lean thinking in HE is in its early stages still.

It might be wondered what made the Toyota much more successful both internally and externally. The research carried out by Hines (2010) identified five elements behind this success:

- **Policy deployment** to focus everyone in the same direction based on what adds value to their internal and external customers
- **Deploying** through a series of cross functional processes, the most important of which Toyota describes as quality, cost and delivery (QCD).
- **Value stream** management
- A set of **tools** is applied contingent on circumstance, i.e. pulled by the customer and business need
- Finally, all the four areas are applied in extended enterprise (Hines P. 2010)

Policy deployment can make a common aim in achieving customer (business) requirement, however the challenge is how to communicate and manage this common aim across the system. And even prior to the communication, the challenge to overcome is:

- How to get to a common aim on what adds value between the multi-stakeholder expectations.

The successful policy deployment on customer value would be the one that has been communicated through the system and managed well through all the changes.

Two decades within the manufacturing arena where customers increasingly insist on high quality products, delivered on demand at a competitive cost (Martin, 2012). Removing waste in the system was and still is the main concept of TPS implementation, however, as Hines (2004) explains the

evaluation of waste elimination been moved from being focused on quality (early 1990s) to quality, cost, and delivery (late 1990s), to customer value (2000 onwards).

One of the methods which Value, current and future, can be identified is the use of Value Stream Mapping. Value Stream Mapping (VSM) or Value stream management, according to Sinha (2010) can be defined as a technique to analyse the flow of material, information and people in order to fulfil an order, whether that order is for a product or service. The current value stream map assesses the current situation of the process and can lead to bottom-up plans to take the organisation from current state through a series of future states towards an ideal state. VSM is used by facilitators and improvement practitioners to identify the current, ideal and future state value stream/ business process/ supply chain/ set of activities (Sinha et al., 2010). According to Womack and Jones (2002), it is vital to check each future state against the main goal of the business.

Within this improvement process a set of tools are applied. It is important to understand that tools are in place to be used after the problem is found using the current state map, rather than to be only tool focused. The problem or “waste” within the system from Lean thinking philosophy perspective can be highlighted in VSM, only against the identified value.

The reviewed Business improvement management methods can conclude while both EFQM and MBNQA are focused on self-assessment and peer reviews using the fundamental concepts of TQM (Radnor, 2010), Lean focus on a way of working, which Radnor (2010) describes as, to identify and eliminates waste to deliver improved value and service.

From a wider view of the business improvement methodologies used within the public sector, it can include application of Lean, Six Sigma, and BPR (Business Process re-engineering) together with Kaizen, TQM, and System thinking (Radnor, 2010). However, because of the idea of Deming, many of these approaches can be referred back to Lean philosophy (TPS) (Radnor et al., 2006). Authors like Proudlove (et al., 2008) have argued that Lean has had the most application in public sector because of its participative nature, while he explains that “in practice Lean appears to be a more participative, bottom-up approach than six-sigma”. One reason for this might be that Lean is characterised as relying more on intuition and deep insight e.g. producing future state value map”. Radnor(2010) by reviewing 162 sources, revealed within the UK public sector, it is the use of Lean which appears to be have caught the attention of public sector specially managers in healthcare.

2.3 Lean philosophy progress

In “The Machine that changed the world” by Womack et al (1990), the term “Lean manufacturing” being introduced as a production system that was better, faster, and cheaper, required less space,

less inventory, and fewer labour hours; and avoided wasteful practices (Morgan,2006). The early implementation of Lean was applied only to the car engine manufacturing, which gradually improved to the car assembly and then to the supply chain. In the period up to 1990, the main weakness of Lean manufacturing was its automotive manufacturing based view and limited appreciation of how to handle variety in demand (Hines, 2004).

Based on Hines (2004) research the progress of Lean since 1980 can be summarised:
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Table 2.7 The evolution of Lean thinking (Hines, 2004)

In Mid 1990s in Toyota four primary processes, vital to an organisation's survival, were identified, each with outcomes of critical importance to the customer; Quality, Cost, Delivery and New product. This is the Lean manufacturing purely applied to manufacturing, as value chain (refer to table 2.5), with the aim of generating new value by optimizing the cost, time, and quality of the process. Quality-Cost-Delivery were the drivers in manufacturing strategy which have led to Lean manufacturing as JIT, Poke-Yoke, Waste reduction in operation. In most manufacturing companies Lean been used to meets its customer requirement base on applying a balance between quality, cost and delivery (QCD) requirements. That was the point when the new 'process-focused' strategy introduced over the 'task-focused' strategy (Dimancescu, 1997).

The evolution towards 'value' and value definition influenced decision making and project choices, as Maleyeff et al.(2012) describes value definition of a global enterprise with a long-term

sustainability is challenging, this would include relationship with a growing number of important stakeholders, which is intangible and difficult to quantify in financial terms.

Meanwhile, Lean evolved into service as the marketplace for services became increasingly competitive, although Lean started as a production system (Antony et al., 2007).

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Table 2.7.1 The evolution of Lean production to Lean service (Resta et al., 2015)

In the eyes of many practitioners observing a manufacturing system, Lean would be associated with cellular manufacturing, Kanban card inventory control, fast setup times, and periodic Kaizen events (Maleyeff, 2006: Imai, 1986). Within a Lean implementation in HE, which it is discussed in more details later on, Radnor (2011) specifies there is a focus on project based activities around one or two processes which are redesigned and not always re-visited or monitored, i.e. there is less on developing a Lean culture. However, the issues of focusing only on RIEs or tools in isolation highlighted by Radnor et al. (2006) and Radnor and Walley (2008), as the “quick wins” generated may be hard to sustain, as they are not integrated into the overall strategic objectives of the organisation. Therefore the secondary process with an internal importance to the competitiveness of the business is information management, personal training, research and development (Hines,

2004). Examples include compensation based on global rather than local efficiencies, a system of continuous improvement, and a culture that supports Lean (Emiliani, 1998). The culture that supports Lean and the problem solver within the organisation can be the result of the overall organisational structure within the system. The most common organisational structure is the one which activities grouped together by common work from the bottom to the top. In this type of organisation whole organisation coordinates and collaborates through the vertical hierarchy, and the decision-making authority resides with upper level managers i.e. a command and control structure. This would leave them with little collaboration across functional departments, while it does not motivate the problem solving culture. In the current rapidly changing environment, top executive are not able to respond rapidly enough to the either problems or opportunities (Kanigel 1997). This is not only due to the environment, but also the manager who is overloaded with the decision to authorise, and the information required from the bottom of the organisation (Gibson L, 2009). On the other hand the organisation who are structured around the processes rather than departmental functions are horizontal. Rather than having a few senior executives, self-directed teams are put in place. Gibson (2009) claims in horizontal structure each team consists of members from several functional areas therefore the boundaries between functions are eliminated therefore they have adoptive culture and collaborative strategy rather than competitive strategy.

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Table 2.8 Two organisations Design Approach (Hurst D, 1995)

The other main differences between the Vertical and Horizontal systems are the information linkages. In vertical organisation if a problem arises that employees do not know how to solve, it needs to be referred up to the next level in the hierarchy, when the problem is solved the answer will be passed back down to lower levels. The Horizontal system uses cross-functional information system. The main difference is managers or frontline workers throughout the organisation being able to routinely exchange information about problems, opportunities and other decisions. This is the environment believed by Womack and Jones (2003) where Lean philosophy can be embedded.

As specified by Hines (2004) in table 2.7, one of the main recent evolutions in Lean was the moving focus from 'QCD' to 'customer value'. This was done by removing wasteful activities within the

process which does not serve the customer ultimate requirement. In this method customer decides what Muda is in the system.

Hines (2004) believes creating a Lean solution must be through reduction of internal waste so that the wasteful activities and associated costs will be removed. This would increase the overall value proposition for the customer. The second step will be to increase the value, these are additional features or services that do not add cost but add customer value. The figure 2.1 highlights the relationship between value and cost, and “the migration from a mere waste reduction focus to a customer value focus which opens essentially a second avenue of value creation” (Hines, 2004).

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Figure 2.1 Creating Lean solution (Hines, 2004)

Being aware of HE Service characteristic as it is being reviewed earlier, for being able to remove wasteful activities within the process it is required to get hold of multi-stakeholder requirements, and then following that by knowing the additional expectation developing the overall stakeholder value proposition.

- Therefore, the implementation of Lean evolution in HE Service requires a primary initiation on how to scope the expectations, prior the application of removing waste.

Lean Manufacturing reduces costs of manufacturing by improving labour utilization, decreasing inventories, reducing manufacturing cycle times, and increasing capacities without capital expenditures (Alp, 2001). However, Lean like any other management concept needed to be improved as the organisations go through the different environment through time and learning curve. And in result the criticism from gaps in Lean concept led it toward progression, for example:

- Lack of contingency; the result of this “build to forecast” approach across Europe is that there are currently \$18bn of unsold vehicle held in European markets, and 350,000 units in the UK (Holweg, 2003).
- Human aspects; as Lean been getting applied more as a hard tool raising the criticism about the human aspect helped Lean implementer to realise motivation, human resource, empowerment and respect are very important. Indeed, the present authors would argue that human aspects elements are, key to the long-term sustainability of any Lean programme, regardless of the industry sector (Hines, 2004).
- Scope and lack of strategic perspective; lack of discussion of strategic level thinking in Lean programmes as opposed to discussions of how to apply a series of different tools and techniques (Hines, 2002). Backing up the point, Hines mentioned, Emiliani (2004) has proposed a 8 steps strategic level thinking in applying Lean to the school:
 - Identify the customer
 - Customer value
 - Eliminate waste
 - Root-cause analysis
 - Scientific method
 - Load levelling
 - Visual control
 - Kaizen

Even though the Emiliani’s strategic level thinking aligns with Womack and Jones Lean principle, but the first two strategies “Customer identification” and “Value” has been written with manufacturing in mind. Value in manufacturing is for a specific product which customer prepares to pay for. But in service organisation, as Radnor (2010) describes defining the value is more complex i.e. identifying customer needs to be specified by taking into account the organisation type, i.e. public, private and the purpose of the organisation. For instance, in the private sector the value can be a product which individual purchase but within public sector organisations, other forms of ‘value’ may well exist which need to be included within the processes and system such as adherence to policy, laws and equity which may not be so prevalent within private sector organisations (Radnor, 2010).

- Coping with variability; as the developer of the Lean concept came from the flattening demand stage the criticism arose when the supply chain needed to cope with variability. Different approaches such as mixed model scheduling and level scheduling and tool like Kanban developed and parallel to that various contributor suggested agile solutions. For

agile solution the emphasis was on dealing with customer demand variability, flexible assemble-to-order systems, creating virtual supply chains and greater use of IT tools (Van Hoek, 2001).

Unfortunately, most managers understand and practice Lean as a set of tools-simple add-ons to conventional batch-and-queue business practices and also view Lean as a way to reduce headcount, usually through a mass layoff (Varnoon, 2003). As a result, most businesses fail to realize the full benefits of the Lean management system (Womack et al., 1990).

Hines (2004) suggests that Lean exists on two levels: Strategic and Operational. The difference of these two levels is the customer-centred strategic thinking applies everywhere, the shop-floor tools do not. The example of this case is mentioned earlier in section 2.2 in TPS tool implementation like Kanban in High variety manufacturing environment. And in hence to remove the confusion Hines encourages the use of Lean production for the shop-floor tools and Lean thinking for the strategic value chain. His approach makes the use of any concept which provides the customer value and can be in line with lean strategy acceptable, even though the tools such as Kanban, Takt time, and level scheduling are not applied.

One of Toyota's strengths has been the ability to learn from others, such as Ford Motor Company, quality gurus, and industrial engineers from the United States, Japan, and Europe, and then carefully adopt the knowledge to its own industrial systems (Morgan, 2006). Morgan (2006) believes Toyota's success comes from hard work, excellent engineers, a culture of teamwork, an optimized process, simple but powerful tools that work, and Kaizen that improves. The only way that a company can make a significant improvement in its system would be with understanding the philosophical idea of Lean and try to build its own development system. Otherwise, it would be like borrowing a tool from Toyota's Lean system and try to fit it in by any means. The literature review in Lean improvement approved Lean had expanded beyond its shop floor application, and had been going through different improvement continuously.

2.4 Lean thinking

Following to the book "Machine that Changed the World" (Womack et al., 1990), Womack and Jones realised the managers in manufacturing are struggling in applying the Lean Manufacturing concept as a coherent business system, therefore they set out to identify and articulate a comprehensive Lean business logic, which later on get called "Lean thinking". To develop the concept 50 different companies throughout the world in a wide variety of industries such as Toyota, Porsche, and Pratt &

Whitney were studied (Womack and Jones, 1996b). Lean thinking has been evolved through different stages, which in particular it includes a greater attention to Strategy and Alignment, Leadership and Behaviour and Engagement (Hines et al., 2007).

Womack and Jones(2005b) specifies Toyota's success in the brilliant management of its core process, i.e. the series of action conducted properly in the correct sequence at the right time to create value for customers. The five simple principles to guide companies to winning in global competition in Lean thinking listed as (Womack and Jones, 2003):

- 1) **Provide the Value** actually desired by the customers. Resist the urge to work forward from existing organisation, assets, and knowledge to convince customers that they want what the firm finds easiest to provide
- 2) **Identify the value** stream for each product. The fact that the principle is called "Value stream" not process stream emphasis on the importance of the "value" which goes through the sequence of actions (process) to bring the good or service from concept to launch and from order point into the hands of customer. That would help us to challenge the current process in the system to check whether they are creating value for the customer or not. The difference of delivering service to multi-stakeholder and customers in HE Service is the point to consider in value stream mapping.
- 3) Line up the remaining steps in **continuous flow**. Removing any bottleneck, waiting, work in progress, or delays between the activities to facilitates the flow for shorter response time to the delivery of the value.
- 4) Let the customer **pull value** from the firm. This is the reverse approach to the push methods that most of the organisation uses while they believe they know what their customer wants, and keep building it but end up with products waiting to be bought by convincing customers. The effect of pull is that production is not based on factory, commitment is delayed until demand is presented to indicate what the customer really wants (Bowerman, 2007). It might sound easy to present pull leading to flow of value/demand as a solution for moving towards system in the manufacturing, but using the same concept in HE Service requires an answer to "what customers really want?" and prior to that "who are the customers?" In service the production of service is simultaneous with the consumption of it, therefore, using the pull concept does not sound practical.
- 5) Finally, once value, the value stream, flow, and pull are established, start over from the beginning in an endless search for **perfection**, the happy situation of perfect value provided with zero waste (Womack and Jones, 2003). In service the value comes from customer expectation, as specified in principle number 1, the waste is anything outside of the value, as

the expectation are not fixed in time, therefore in exploration for perfection it is needed to deal with change of expectations over the time.

Whilst the core principle of Lean Thinking, i.e. Identify Value, Value stream, Flow, Pull, and Perfection gets all the attention for implementing Lean in any process/organisation (Womack and Jones ,1996b), the most important element is argued to be 'specify and identify the value' (Womack and Jones, 1996b), specifying 'failure to specify value correctly before applying Lean can easily result in providing the wrong product or service in a highly efficient way'(Womack and Jones, 1996b). Several authors such as Seddon (2008), Silvester et al. (2004) Walley and Silvester (2006) have highlighted the importance of understanding demand in public sector. All the services, from banks to call centres and universities had built a help desk/ help lines for "Failure demand" to deal with the failure of delivering service instead of everyone working together to perfect the entire consumption (Womack and Jones, 2005b). The research from the authors indicates that in local authorities the level of failure demand can be 80% (Radnor, 2010). This is a situation where the consumers struggle with broken consumption processes and providers struggle with defective provision processes (Womack and Jones, 2005b).

Companies may think they can save money and time by delegating and off-loading the activities to customers, i.e. as Womack (2005b) describes make it customer problem to solve it and waste customer's time by streamlining the system for service provider. In fact, the way to do it as Womack (2005a) specifies in Lean Consumption, is to tightly integrate and streamline the process of both 'provision' and 'consumption'. Based on the approach, there is a need for fundamental change on the way the service provider currently apply Lean thinking and think about the relationship between the provision and consumption and the role their customer plays in the process.

The principles of Lean Consumption are based on (Womack and Jones, 2005a):

- Solve the customer's problem completely by insuring that all the goods and services work and work together
- Do not waste customer's time
- Provide exactly what the customer wants
- Provide what's wanted exactly where it's wanted
- Provide what's wanted where it's wanted exactly when it's wanted
- A continually aggregate solution to reduce the customer's time and hassle

Meeting customer requirement solely by balancing quality, cost, and delivery is a difficult area requiring significant analysis and planning of each customer's specific need (Pham, 2008). As referred to in section 2.3, in manufacturing the QCD for each customer can be prioritized inversely, with delivery being a major issue for one customer for another one cost can be the priority. That's

where each company can formulate different operational strategies and based on that develop a working plan (Radnor, 2010). As in manufacturing specifying “customer” and their requirements for tangible product is much more straight forward than the service, the “value” is easier to be defined and based on that the important driver between QCD can be used in operational strategy of the organisation (Radnor, 2010). In manufacturing the product provider by learning the attributes of value from customer perspective can put in place single drivers which are the same for provider and customer in the system. Whereas in Service multiple customers and intangible product make the realisation of main driver of the organisation difficult, and in result, it is most of the time the QCD from an organization perspective rather than customers. This is what was explained by Radnor (2010) earlier on as ‘management facing’ rather than ‘value facing’.

Service processes differ from manufacturing factory processes, and this is fundamentally because of the uncertainty of the service development process at the beginning as the output is not tangible and the exact content is not known, Radnor (2010) explains manufacturing differs from service organisation where there is probably a better understanding of customer requirement, process and demand. This is opposite to the repetitive factory operations, where the next product aims to be made exactly the same as the last one. The value in service require to be defined and measured differently as Seddon (2005) specifies “in service the people and system are inseparable and it is people not machine who determine the system”. Flow of information which builds up the value stream map for service is less easily traceable than the material flow in manufacturing (Womack and Jones, 1996b). This can increase a high level of uncertainty within the service. It can be argued that information flow exists in manufacturing as well, but in manufacturing it is based on material flow to control with the aim of scheduling like Kanban system, Supermarket, Takt time, while in service the information flow is in place for feedback to upstream managers (Womack and Jones, 2002). Therefore the service process acts upon information, although this is not a fundamental difference, but it does complicate the application of improvement, Spear (2005) assures even though the improvement in service is not as easy as in manufacturing but if the changes are made in manageable chunks the improvement will be possible.

One of the issues highlighted by Radnor (2010) in Lean thinking implementation in the public sector is “finding ways for public sector managers to view their organisations as a system and not a series of functional processes or activities. This means supporting a structure which is ‘value facing’ rather than ‘management facing’”. This may mean understanding processes not just across functional but organisational boundaries”. System thinking which Sudden argues should be the basis of Lean and business process improvement argues the same point, as if managers do not understand system thinking then the implementation of process improvement methodologies will always be limited.

System thinking is explained by Radnor (2010) as “Seeing the system as a whole, managing on data, what is demand from the customer, what is value/failure and waste (from the customer’s perspective), process mapping, use of control charts as a measure of flow.”

Martin et al. (2012) emphasis Lean in the public sector can work but that it is not the adoption of Lean from manufacturing rather adaptations with no single dominant approach evidenced. John Seddon (2008) describes the present style of management in public sector as ‘command-and-control’ management, and from his point of view ‘Lean manufacturing’ fits in this management style, as it is tried to use the tools developed to solve problem in manufacturing in service. Both Gullledge et al. (2002) and Seddon &Caulkin (2007) suggested that as in command-and-control thinking the purpose of the system is set to meet the target, the work gets designed only around the reporting requirements rather than the customer requirements, which is the main reason of failure in improvement. Paying attention to the detail that Service organisations are not ‘assembly lines’, they are different kind of systems, will make their explanation more reason proof. While Seddon (2008) does not agree on using the Lean manufacturing and specifically the ‘Lean tool’ in service, he uses the Lean philosophy and Deming to build up the ‘system thinking’ model for service. The system thinking suggests overcoming the current Lean manufacturing battle in which service staff complains the repetitive work by involving them (Seddon, 2008). He emphasises the repetitive work would lead to more handover and handover lead to waste, and in result have to deal with more failure demand and customer has to wait longer. He clearly approves the fact that using Lean manufacturing in service will produce more errors, by reviewing different public sectors that used Lean manufacturing such as HMRC (Her Majesty’s Revenue and Customs). The main point that he makes in system thinking is the problem would not be solved on working on people’s activity, but they should be involved and engaged in improving the work. Radnor (2010b) agrees with Seddon by questioning the approach, “maybe what is important is not that standard work is developed but better understanding and management of the types of demand so staff operate within a framework that supports stable process which are clearly defined with clear options and choices for that “family” of requirements similar to approach taken by cellular manufacturing”.

- The Lean philosophy holds through but the methodology does not as the areas like value identification on intangible product does not work the same as tangible product, Pull value while the provision is simultaneous with consumption in service is not practical, and methods like Takt time or Kanban system in service does not fit for the environment as the system need to absorb variety not the flow.

It can be summarised that QCD priority investigation for targeted customer can fulfil the customer expectation; however, what makes great profit for the organisation is the realisation of what

customer specifies as 'value' within the product/service and willing to pay for it for instance is it the brand, shape, or the specific material and function (Womack and Jones, 2003).

There is a range of different methods and concepts which has been used in manufacturing to translate the Voice of Customer (VOC) to the engineering side of the organisation to action on it.

One of the concepts introduced by Woodford (1996) was Customer Value Determination (CVD). The concept goes through six steps, and for each step it suggests a technique to be used in.

a. Identify Target customer; those whose value matters to the seller

In order to be able to expand the first step of CVD to HE Service, it is required to identify Customers/Stakeholder of the service, as HE is not dealing with a single Customer in providing its service. And those whose value matters for the seller (in this case service provider) is multi-stakeholder. Comparing initial step of CVD with Lean Enterprise Self-Assessment Tool, for the enterprise which customer value does not guide the strategy, selecting the target customer would not be within a right-range.

b. What do target customer value;

This step appears to be more techniques focused to gather the customer's value. For instance through laddering interview and analysis perceived customers' value can be investigated. The other qualitative technique which gives an opportunity for investigation of a broader range of desired value dimensions introduced by Woodruff (1996) is the ground-tour techniques. The technique uses in-depth personal interviews to get customers to take the interview on a "tour" through selected uses situations and occasions to understand better what happens during product use.

c. Of all the value dimensions that target customer wants, which ones are most important?

Managing a long list of preferences of consequence value dimensions is not practical as the organisation cannot work on so many different values therefore the need to screen customer value is required. However, Woodruff (1997) believes the techniques only can handle relatively few value dimensions at one time. Based on that clearly more work is needed on how to over-come this deficiency.

d. How well or poorly are we doing in developing the value that target customer want?

Even though the first three steps do not seem to be common in businesses or HE, but this step is delivered widely by survey or feedback. Both tools are used to evaluate how well the seller is providing the product or service to the customer. A especial care is required in designing the survey question. It is recommended by Woodruff that surveys should contains questions at the consequence level as well as attribute level, i.e. how well we are providing the end product, as well

as what do you expect to see in the delivery of the product. Because the questions only based on product quality, on-time delivery would provide the seller limited insights.

e. Why are we doing poorly/well on important value dimensions?

In reality the descriptive question in survey are the ones with low rate of response, if the company is doing well customers usually don't spend time on surveys, but if there is any shortcoming they might raise the complaint. Having a system in place to analyse and gather the complaint can help on investigating why we are doing poorly, too. The drive that there is a defined step on reviewing the reason for exploring customer reasons on satisfaction rating is the survey's satisfaction results show how the customer evaluates the strength and weakness of the delivered value, but it does not provide insight into why customers made these evaluations. For example the satisfaction level of on-time delivery can be rated as poorly by the customer, in this case does that mean the seller was not quick enough? Or can it mean the seller define the on-time delivery different from the customer.

f. What are the target customers most likely to value in the future?

Apparently, few organisations systematically and continuously try to predict future customer value (Hamel, 1994). The preferred attributes get mentioned by customer are the one which can lead us to the future value. Consequently, it is needed more indirect approaches for making these predictions, based on multiple data sources (Woodruff, 1997). CVD uses only formal consumer research, but the organisation always has other sources of customer data, and because of that the next level is suggested by Woodruff (1997), the use of CVOMIS (Customer Value-oriented Marketing Information System) and to deliver strategy based on customer value it is recommended by Woodruff that both of CVD and CVOMIS to be created and implemented at the information system.

Reviewing the steps it is apparent that dealing with qualitative data is required in order to explore the customer expectation. The two qualitative techniques which approved their utility on their approach for Voice of Customer are Kano model and Quality Function Deployment (QFD).

Kano gets used to understand different aspects of how customers evaluate a product or offering within time. Kano, speaking of quality, talks about "basics", "performance factors", and "Delighters" (Bicheno, 2012). Kano model is a tool for surveying customer satisfaction with quality attributes based on a dysfunctional and functional questionnaire and then categorise the results of survey using an evaluation sheet based on 5 different categories:

1. Attractive; not expressed, customer tailored, cause delight
2. One-dimensional; articulated, specified, measurable, technical
3. Must-be; implied, self-evident, not expressed, obvious
4. Indifferent and
5. Reverse (Berger et al., 1993)

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Figure 2.1.1 Kano model of customer satisfaction (Berger et al., 1993)

Kano does cover the dynamic characteristics of the customer requirements, as well as the customer segments the target market includes. QFD helps assure that expected requirements do not fall through the cracks and points out opportunities to build in excitements (Mazur, 1993). QFD is used once the customer requirements are obtained, in order to translate customer requirement attributes to actionable plan. Traditionally QFD was a structured methodology that uses four matrices to translate customer requirements into specific quality design and manufacturing requirements for total customer satisfaction (Donald, 1998). There has been a movement toward using the traditional QFD matrices within the service environment. And the reason for that was the need for translating VOC to actionable plan for the service. Service does hold characteristics that are different from manufacturing. Those making the tools and techniques used in manufacturing not all compatible within the service are:

- Services are more or less intangible.
- Services are activities or a series of activities rather than things.
- Services are at least to some extent produced and consumed simultaneously.
- The customer participates in the production process (Gronroos, 1990)

Within the attempt made for QFD implementation in service there is an approach which is based on 3 matrices (Donald, 1998):

1. First matrix is based on customer desires versus service measures, or what's versus how's. The matrix defines how customer desires are going to be measured, when the service is instituted
2. Second matrix contains important service measures (what's) versus service design characteristics (how's). The output will be the answer to how should a service be designed a built to optimize the measures.

3. Third matrix is to manage service quality at the most basic level and in a consistent manner by detailing the service design characteristics for daily quality management (Donald, 1998) i.e. if this is what the service should be, how will the service be managed to insure daily consistency.

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Figure 2.1.2 QFD flow-down process House of Quality (HoQ) in service industry
(Paryani et al., 2010)

The output of the first matrix is “Quality attributes” for the service, the output of the second matrix is “Process Deployment”, and the third output is “Strategy Deployment” for the service. Both Kano and QFD in service have been used as a method to translate customer voice to understandable attributes to business. Godoy (1996), describes the QFD in health care system is applicable towards deploying the voice of the customers in understanding their requirements and to include them in continuous improvement of quality service provided. Pun et al. (2002), conclude this in turn help determine internal quality goals and objectives and develop improvement plans.

LAI (Lean Aerospace Initiative) developed a Lean Enterprise Self-Assessment Tool (Womersley et al, 2001) with the aim of structured data driven improvement process to coordinate a transformation to Lean in product development and process improvement in manufacturing. The tool builds up its stages by going through the Deming model, and establishing 3 main sections of:- Lean Transformation/leadership, Life-cycle Process, and Enabling Infrastructure. Focus on Customer value gets assessed within initial stage of strategic planning in transformation section through to the distribution of the product in life-cycle section. The tool evaluates enterprise customer and stakeholder focus level and involvement by ranking the enterprise capability level on (Womersley et al, 2001):

- Focus on Customer Value; Customer pull value from enterprise value stream i.e. “customer value” strongly guide the enterprise strategy
- Understanding the current Value Stream; it is clearly understood how the business delivers value to customers
- Establish a Requirement Definition process to optimise lifecycle Value; product life-cycle data used in determining requirements and subsequent specifications
- Utilise data from the extended enterprise to optimise future requirement definitions; closed loop process such as feedback are in place to capture operational performance data
- Incorporate Customer Value into design of products and processes with the aim of continuous improvement of product and process
- Incorporate downstream Stakeholder Values (manufacturing, support, etc.) into products and processes

For designing a new product while the Customers pull by expressing their requirements, it is in enterprise favour to gather the needs and requirements to secure its business opportunities, rather than define the requirement internally based on past experience (Womersley et al, 2001). For future requirements it is recommended by LAI to actively seek process capability based on feedback from customer to capture input. Based on the evaluation, customer and stakeholder involvement and inputs are required not only on design phase but also on product development phase of the product as well. The aim proposed by Womersley et al. (2001) for involving customer is to allow continuous improvement of the product while involving the downstream stakeholder allows early consideration of issues throughout the design development.

2.5 Customer Value

Defining value is challenging (Ng et al., 2012), driven by more demanding customers, global competition and slow-growth economies and industries, many organizations search for new ways to achieve and retain competitive advantage (Woodruff, 1997). The strategic intent is not to capture higher market shares than competitors, but to gain sustainable competitive advantages within certain market segments to create a high level of customer satisfaction and loyalty (Kordupleski, 1994). As for being in market it is needed to have sustainable presence first. The assumption made by organisation on having high quality means better customer satisfactions lead the organisation toward presumption of knowing what customer wants. Therefore so far, customer satisfaction has been seen mostly as one-dimensional construction-the higher the perceived product quality, the higher the customer’s satisfaction and vice versa, but fulfilling individual customer expectation to a great extent necessarily does not imply a high level of customer satisfaction as it is also the type of

expectation that defines the perceived product quality and thus customer satisfaction (Matzter, 1996).

In case of not involving customers Franke (2006) highlights the point that it has long been assumed that companies develop new products for consumers while consumers are passive recipients-merely buying and consuming. Effort by many researchers (Hoyer et al., 2010; Verleye et al., 2014; Tiets et al., 2005) has shown that this traditional innovation paradigm is fundamentally flawed and consumers themselves are a major source of product innovations. Aligned with researcher, Ng (2014) emphasises the importance of consumer's perception of value-in-use over traditional views of exchange value and other seemingly 'objective' (i.e., externally defined, 'given') measures of value that are too firm-centric.

While quality tools have helped to improve the product, already in production and process, the thought of considering customers to make improvement within the organisation been implored to be used to bring Voice of Customer in quality improvement changes, by 'Customer Satisfaction Measurement' (CSM). However, application of CSM had fallen short of its promise for several reasons:

- Many organisations have responded by setting customer satisfaction goals and strategies, but only few have rigorously measured their customer satisfaction (Duka, 1994)
- Even those companies that measured satisfaction may not act on the results (Duka, 1994)

Gross (1997) argues, the satisfaction construct need to be replaced with value, as a better predictor of outcome variables in business. This is while in more recent research in service the empirical verification reports that service quality, service value, and satisfaction may all be directly related to behavioural intentions when all of these variables are considered collectively (Cronin et al., 2000). The service management literature argues that customer satisfaction is the result of customer's perception of the value received (Hallowell, 1996), and this is based conceptually, on amalgamation of service quality attributes with such attributes as price and other preference (Athanasopoulos, 2000).

Some other organisations started to improve their organisation by encompassing the structure, process changes, downsizing, restructuring, and re-engineering (Woodruff, 1997). Nevertheless, according to Hall (1993), the way the organisation works may change, but if it still does not have the desired impact on bottom line performance and what the customer pays for, it will not be successful.

- This indicates the importance of learning the effective performance, with having customer requirements covered.

Value is the customer's overall assessment of the utility of a product based on perceptions of what is received and what is given (Zeithaml, 1988). Radnor (2010b) simply describes 'value' as "the opposite of waste is value, which is what customer requires". Anderson (1933) describes value in the business as "value in the business market is the perceived worth in monetary units of the set of economic, technical, service and social benefits received by a customer firm in exchange for the price paid for a product, taking into consideration the available suppliers' offerings and prices". Monroe (1990) describes value from trade-off aspect by "Buyers' perceptions of value present a trade-off between the quality and benefit they perceive in the product relative to sacrifices they perceive by paying the price." By Customer value, it means the emotional bond established between a customer and a producer after the customer has used a salient product or service produced by that supplier and found the product to provide an added value (Butz, 1996). In all mentioned value description there is a common point which stands out, and that is the 'Customer' who defines the value on provided product or service.

Drucker (1998) expresses the customer-defined value by "what is our business is not determined by the producer but the consumer. It is not defined by the company's name, statutes, or articles of incorporation, but by the want the customer satisfies when he buys a product or service. The question can therefore only be answered by looking at the business from outside, from the point of view of the customer".

And this value can differ for customers based on their preferences, as Zeithaml (2006) describes:

- The value is low price, for these customers the lowest price is the best
- Value is whatever I want in a product or service, this focus on benefits rather than price
- Value is the quality I get for what I pay
- Value is what I get for what I give, i.e. all benefits against all sacrifices, not just money

Zeithaml (2006) descriptions of value show the importance of knowing who the customer of the service/product is as the requirement for the customer is dynamic and does differ, depending on their priority. Value is Womack and Jones' first Lean principle and as Morgan (2006) emphasizes the primary directive of any true Lean system is establishing and delivering customer-defined value. And he explains it as "Define value precisely from the perspective of the end customer in terms of a specific product with specific capabilities offered at a specific price and time (Womack and Jones, 1996b)". To emphasize the importance of identifying value, Taiichi Ohno (Womack and Jones 1996b) specified "all industrial thinking must begin by differentiating value for the customer from Muda (waste)". To successfully provide experiences that customer desire, relevant components that impact the experiences must be incorporated deliberately and from the outset (Pine & Gilmore, 1999).

The commonalities between all the definitions can be categorized as:

- In all, the customer value is linked to the use of some product or service, which means the customer value, is different from organisation aim or value.
- Customer value is something perceived by customers not the manager, staff or service providers or even the objectives set within the organisation
- And finally these perceptions involve a trade-off between the producer and the customer for instance what the customer receives quality, service, utility and what he or she pays to acquire and use the product e.g. time, price.

Despite the recognised importance of the customer in the creation of value, research has largely presented business-to-customer delivery case examples with little focus on the contribution made by the customer in the realisation of an experience (Angelis, 2012).

Businesses that practice Lean management well are formidable time-based competitors, because information (e.g. Parts, documents, verbal communication) flows with fewer or even no interruptions (Emiliani, 2003). Nevertheless, it is critical to mention prior to any improvement on streamlining the processes, it is important to know what the Value for the service is, to be able to remove the waste against it. Streamlining the processes in place where these do not add value from the service delivery aspect, and making them more efficient does not make the service more effective overall.

It is easy to trap to the illusion of applying Lean in the organisation, while the Value been the one specified by the organisation not the customer and in result not achieve flow and improvement (Radnor, 2010). From a Lean perspective first there is present value, i.e. what present customers are willing to pay for, and then there is a future value, i.e. what tomorrow's customers are willing to pay for (Bicheno, 2012). Hence, to achieve desirable outcomes, perceptions must be understood and managed as an integrated part of service operation (Ng et al., 2009).

Value for the product is to do with the required functionality or quality, it's worth and to what extent the end customer is prepared to pay for it but for the service it is more complex. Customers will be satisfied with the company's service when value within the service is out of the question for them. To reach to that point the organisation requires thoroughly understanding that value.

What makes the value specification in service complex are:

- The intangible output
- More than one range of customers/stakeholders, which makes confusion of multiple customers and stakeholders often with a poor customer focus
- Provision of service and consumption of service take place simultaneously

- Provision of service is labour and knowledge intensive rather than capital asset intensive
- Customers are part of the activities for delivering the service, i.e. the customer interaction generally is high
- Because of the service being knowledge intensive, human elements are very important
- Quality is perceived therefore it is hard to measure
- Rapid response time is expected as must be in place
- Site of facility is extremely important where as in manufacturing the site can be moderately important

This implies that all the points of customer-firm interaction are critical for creating value and value is 'co-created' through their reciprocal and mutually beneficial relationship (Vargo et al., 2008). Similarly Ng and Guo (2011), argue that 'service co-production' is grounded by interactions between the firm and the customer at individual level. That includes the individual employees' day-to-day service performance whose work spans the boundaries of the organisation. These are opportunities to collect data about the consumer's process at specified points of interaction (Parry et al., 2015).

In service there are two levels of 'demands' entering the service, "Value", and "Failure" demand. "Value" demands are the ones which companies are in business for and want the customer to place an order for them. Failure demands are "demands cause by a failure to do something or do something right for the customer" (Seddon, 2003). The aim should be on investigation of value and elimination of failure demand i.e. waste.

2.5.1 Waste in Service

Removing waste in the system was and still is the main concept of Lean implementation, however, the evaluation of waste elimination been moved from being focused on quality (early 1990s) to quality, cost, and delivery (late 1990s), to customer value (2000 onwards) (Hines, 2004).

The seven introduced wastes in Lean manufacturing are transport, inventory, motion, waiting, overproduction, over processing, and defects. One of the examples of 7wastes in service (Healthcare) is listed by Bowerman (2007) as:

- Transport; movement of patients and equipment
- Inventory; Unneeded stocks and supplies
- Motion; movement of staff and information
- Overproduction; unnecessary tests
- Overburden; stressed, overworked staff
- Defects; medication error, infections.

According to Emiliani (2004a) despite the wording of these terms being more manufacturing oriented, nevertheless they are applicable to various sectors including the educational. Seddon (2008) argues however that the 'seven types of waste' are a feature of manufacturing flow and in service organisations waste takes different forms. He posits that the forms of waste depend on system conditions; measures, roles, process design, procedures, information technology, structure, and contracts (Seddon, 2008). And to remove waste he suggests focusing on understanding the particular system conditions that are creating waste in the particular flow.

An alternative view is proposed by Bhatia and Drew (2007) who classified the waste related to public sector as:

1. Waste; scrap and rework, waiting, inventory, unnecessary motion, unnecessary transport, over production and over processing
2. Variability; examples of which in public services include the variation of gathering evidence for a trial
3. Inflexibility especially with regard to staffing levels being inflexible and the same every day on the assumption that a standard service necessarily offers economies of scale, whereas customer segments require different levels and types of service.

Bhatia and Drew (2006) suggested that therefore a crucial element of Lean is the removal of waste, variability and inflexibility. The traditional approach to coping with environmental uncertainty was to establish buffer departments (Daft, 2007). The aim for setting up buffering roles was to absorb uncertainty. Buffer departments surround the technical core and exchange materials, resources, and money between the environment and organisation. The concept is used in future state map of most of Lean manufacturing as supermarkets with planned buffer and the aim to facilitate the flow of parts through the process and remove waiting waste. A newer approach tries to drop the buffer and instead get well connected to customers and suppliers (Daft, 2007). This indicates the fact that being connected to customer is more important than the internal efficiency.

The concept of waste in most of the literature has been defined within the operational area, however the challenge of progressing Lean thinking to the service, detailed different wastes into four general groups; -People energy, Process waste, Information waste, and People work (KCG, 1999; Mika, 2001; Dimancescu, 1997).

- People energy waste is divided into the more specified area; - focus waste, ownership waste, assignment waste, control waste, goal alignment waste, skill utilisation waste (Martin, 2012).

Within Lean it is stated that all other activities that do not provide value are a waste and should be eliminated (Hines et al., 2008), for instance the energy from people that is focused on delivering more work or assignments that is not required, not having ownership either in improvement or activities within the service, control waste by underutilizing people talent and knowledge, and goal alignment waste in which the improvement and organisation strategy are not aligned.

- Process waste; Strategic waste, sub-optimization waste, standardisation waste, reliability waste, unbalance flow waste, work around waste, checking waste, boundary waste

The process can be defined as “patterns of interconnected value-adding relationships designed to meet business goals and objectives” (Dimancescu, 1997) or “A cross functional set of interconnected activities that adds value to meet business objectives” (Hines, 2010). The more general definition, defines process as, “A chain of activities with a clear starting point and a clear endpoint, consisting of a number of steps, in both planned and repetitive and has a goal and expected results” (Aronsoon, 2003). The definitions show activities which are not in line with business goal or identified value do not fit in “process”. However, in reality, there are always activities which seem to be part of the process, but they do not full fill any of the requirements in the definition. Justifying whether an activity fits within the process as a value added activity requires understanding the value, and condition that the system is working in. The activities out of value concept, needs to be highlighted as waste and be removed. According to Hines (1997) there are five stages to remove waste from processes:

1. The study of the flow of processes
2. The identification of waste
3. A consideration of whether the process can be rearranged in a more efficient sequence,
4. A consideration of a better flow pattern, involving different flow layout or transport routeing, and
5. A consideration of whether everything that is being done at each stage is really necessary and what would happen if superfluous tasks were removed.

The 5 steps recommend the study of current activity flow, while questioning the necessity of doing it and the sequence.

The argue behind reviewing the process comes from most visionary business leaders that suggest it is the processes (Radnor et al., 2012), not functions or department that deliver customer value and satisfaction. The reason and purpose of it is to ‘qualify’ your company in the eyes of buyer, and demonstrate the capability that will win an order, you would require a streamlined process that delivers customer value. The order winners can include vastly superior levels of quality, cost, or

delivery as well as features or services that differentiate the product and benefit the customer (Dimancescu, 1997).

- Information waste; missing information wastes, translation waste, inaccurate information waste, irrelevant information waste
- People work wastes are divided into three categories: processing waste, motion waste, and waiting waste. (KCG, 1999) & (Mika, 2001)

A further waste according to Seddon (2008) is 'Failure demand' a waste produced on how the system functions. It has been described as "demand caused by a failure to do something or do something right for the customer". Within his study of public sector the typical examples raised are; progress chasing of customer orders, and having to bring in documents that have been brought before, which all represents demands caused by failure of service to work effectively from customer point of view. Nevertheless as failure demand lies in how the system is designed and to remove the waste what Hines (1997) suggested for removing waste in process can be applied to understand the end-to-end flow of work, but Seddon (2008) adds the point that the study needs to be from claimant's point of view. The same concept been raised by Womack and Jones (2005a) who specifies it as Lean Consumption, to map the process of both 'provision' and 'consumption' for understanding the flow from customer point of view.

The concept of elimination of waste might appears simple, Martin (2012) identifies that despite the simplicity of the concept, in most organisations, due to the lack of understanding or emphasis made, and there is generally a much higher proportion of waste than value added activities. Emiliani (2004a) shares his view where he states that only 5-10% of the activity in most cases is value added.

2.6 Lean implementation in Service Industry

The review of Service industry for implementation of Lean thinking has been undertaken by considering any organisation, whether it is classified as a manufacturing, service, non-profit, or government entity, includes a number of internal service units that as Maleyeff (2006) suggests ultimately affect its long term performance. And each unit can provide service, either to internal or external customers. Service now constitutes the majority employer and source of income for developed economies, accounting approximately three quarters of gross domestic product in the USA and UK (Zeithaml, 2003). Despite the fact of service being important to the economy the service quality delivered is not meeting the customer requirement in most cases. In the USA researchers have reported customer satisfaction rates to be at all-time low (Fornell, 2008), while in the UK, a 12 month study of British adults shows 86% complaining for the poor quality customer service (Acland,

2005). This is when the indicators recommend the level of service quality is actually declining, with year-on-year service deteriorating by significant amount (Dickson et al., 2005; Piercy and Rich, 2007). Although it is often thought Lean principles are hard to apply to other sector (Crute et al, 2003), partly because for many workers became synonymous with company downsizing (Emiliani, 2004), or it has been hampered by the belief that Lean only applies to repetitive processes (Locher, 2008), it has been used effectively in areas like Call centre operators, government department, Higher Education institutes and Healthcare. Lean principles have been increasingly applied to service through waste reduction concept to improve either customer satisfaction or organisational performance. As Radnor (2011), Hines (2007) and Emiliani (2004a), pointed out, Lean has grown from the application of two principles; Continuous improvement (CI) and respect for people.

For instance the service industries where Lean has been used recently include; insurance (Hammer, 2004), retail sector (Eriksson et al, 2013), education (Emiliani, 2004), and environmental consulting (Ball and Maleyeff, 2003), Healthcare and Hospitals (Wysocki, 2004, Radnor 2010b, Radnor, 2012). In which based on Radnor (2011) the main drivers for introducing business process improvement methodologies are stated as the need to reduce costs and increase quality. Nevertheless, customer experience been aimed to be improved in cases like healthcare, hospital and education (Radnor 2010, Emiliani 2004, Radnor and Burgess, 2013).

Locher (2008) specifies that the typical benefits of the successful Lean application include greatly reduced lead-times of 40-90%, reduced processing times of 30-50%, and improved quality of 30-70%. The other drivers specified by Radnor (2010) in public sector for change can be listed as; A change of Leadership, Struggle with performance indicators, the introduction of a new technology, Government agendas, changing policy environment, threat of competition, demand for increased efficiency, and service expansion with limited resources. In recent year there has been a move towards Lean implantation and both Tesco (Zokaei et al., 2013) and NHS (Radnor et al, 2012) has been through a journey in using Lean. The specified benefits that are seen include:

1. Reduce waiting time
2. Lower costs
3. Improved customer experience (Diamond, 2011)

As it is explained earlier on this research, manufacturing organisations achieve their primary purpose through the production of products, service organisation accomplish their primary purpose through the production of services, such as education, health care, transportation, banking, and hospitality (Daft, 2007). Although the boundaries between product and services are increasingly blurred, with many manufacturers offering services in support of their products (Heineke & Davis, 2007), the most obvious difference is that service industry produces an intangible output, it is abstracts and consists

of knowledge and ideas, the production of the intangible product happens simultaneously with its consumption, and the product does not exist till it is requested by customer.

In order to review the methods and approaches used in managing stakeholders' expectation and value realisation in implementation of Lean thinking in service, selective cases where the driver of the implementation is efficiency, studied.

2.6.1 Lean thinking implementation in Call centre

The case being used from consulting process of three UK-based call service centres in financial service industry. They were all sharing the experience of management pressure for reduction in operating costs and customer complaints about poor quality. Each company suffered similar problems: increasing call volumes, increasing lead-times to resolve customer issues and increases in the numbers of issues that were being passed to special processing (Piercy, 2006). Customer satisfaction was declining while the queuing, work in progress and in result the staff cost rose.

The process of applying Lean in Call centre went through 9 stages:

1. Investigating the major problem; which in this case been highlighted as poor customer service quality and raised operation cost in result
2. Forming a performance improvement team, from staff and senior managers
3. Going through a rigorous training schedule on Lean techniques, training divided to two level of senior manager briefed on Lean concept and improvement team trained in detailed mapping and improvement techniques
4. Mapping out of the process of value delivery & using the tools to analysis the current state; by visualising the current state many problems were quantified for the first time
5. Re-educate the organisation to familiarise them with actual concept behind the tools, i.e. working on system thinking and problem solving skill
6. Classify the problems within the current state maps, by investigation of problem at the entry stage, problem at processing stage and problem at the end stage
7. Investigating the problem in more depth and details, by finding the root cause of the problems; employee could not handle the customer well due to system design, and wrong performance measure in place
8. Determine the critical issue for the customer (Customer Value) by viewing the process from customer point of view; customer wanted their call to be resolved at first contact by a single person
9. Process re-engineering; by planning for an end-to-end change

Based on what been found in stage 7, after the more depth investigation on the problem, having a wrong measure in place which was efficiency based rather than effectiveness, or system in place to manage failure demand, was highlighted as a waste to be eliminated.

Based on the findings the key changes as shown in table 2.9 has been decided as:
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Table 2.9 Key changes in Call centre with application of Lean (Piercy, 2006).

The improvement made in call centre, covered the area of culture change by up-skilling and re-educating the organisation to improve the problem solving skill and empowering workers, as well as the restructure of the organisation, while moving away from measuring the performance efficiency to focus on value and effectiveness. The key changes required focusing on 'value' was after an increased call volume and Lead-time by customer complaints about poor quality i.e. by failing to deliver the service. This approves in practice the requirement raised by literature, such as Ng (2014) emphasises the importance of consumer's perception of value-in-use, for effective performance.

The tools used to achieve improvement are drawn from a common Lean toolkit; process mapping, modelling of backflow and failure demand, process re-engineering and problem-solving (Bicheno, 2004).

2.6.2 Lean thinking implementation in Health sector

Healthcare sector within the UK operates within a competitive environment where there is increasing pressure to deploy resources more efficiently and improve service delivery and thus provide value-for-money for patients and to also meet government set national targets (Garner, 2009). Following to the benefit realisation of Lean thinking implementation and the requirement for deploying resource more efficiently, as Balle and Regnier (2007) suggested too currently lot of interest is being shown in the application of Lean principles within the healthcare sector. One part of the research that had been focused on is supply chain inputs to the healthcare system for inventory reduction and cost while the greater part of research is on the movement of patients through the

treatment service. However, much of the evidence of improvement to-date focuses on local (area or department) redesign or reorganisation through the use of 5s or visual management techniques rather than on the end-to-end process that require significant synchronisation and control of activities along the patient pathway (Souza, 2009). Various approaches and tools have been used including flow, rapid improvement event (RIEs), process and value stream mapping, standardising systems and root cause analysis in hospitals to improve emergency care services, intensive care units and operating units and to reduce waiting times (Radnor, 2010).

Outcomes from Lean implementations in the health service in Scotland as Radnor et al. (2006) described included “improving customer waiting times to first appointment in the health sector from an average 23 to 12 days and improvement of customer flow time for patients of 48% “, moreover the RIE at NHS Trusts in the UK have provided quick results (Radnor, 2010). The Royal Bolton Hospital staged RIE where employees brainstormed process improvements the result was that the death rate for patients fell by a third (Guthrie, 2006). Also the time taken to process important categories of blood fell from one day to three hours (Guthrie, 2006). The Royal Devon and Exeter Hospital Trust also used Lean techniques to remove waste from its back office helping it to meet financial targets (Guthrie, 2006; Radnor, 2010).

While Jimmerson (2007) describes Lean in HC (Healthcare) as exactly what the patient need defect free, one by one customized to each individual patient, no waste, safe for patients, staff and clinicians (i.e. physically, emotionally, and professionally), it is reviewed the actual implementation on Lean in two aspects of patient progress and healthcare supply chain.

1. Patient progress within the system

Based on Garner (2009) Lean implementation in healthcare the project been through stages of:

- Establishing the project team who included team of 2 managerial and 3 administrative staff
- Workshop and assistance from external consultant to learn about Lean
- Mapping the essential task in healthcare service by using value-stream map
- Determining the relevant stakeholder of the process, and make stakeholder map
- Identifying waste through gathering quantitative data from staff who owns the process
- Discussion between main stakeholders (service providers/process owner) for indication of waste process that could be removed
- Redesign the future process map and plan the system improvement
- Development of visual control tool called CRA (Control Room Anywhere) by using planning and control tool and usage of process standardisation

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Table 2.10 Key changes in Health centre with application of Lean (Grove et al., 2010)

Grove et al. (2010) raise the concern of 'multiple customers such as the patient, government agencies and families meant that the focus was rarely on achieving patient satisfaction'. The next challenge that Grove et al. (2010) refer to is despite the agreed definition on value, observation of Lean workshops revealed that clinical and administrative staff found it difficult to identify waste in the service.

2. Lean and Agile healthcare supply chain

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Table 2.11 Leagile applications at Health centre (Aronsson, 2011).

One of the cases which has been using Lean management since 2002, is Virginia Mason Medical Centre. The Virginia Mason Production System (VMPS), modelled based on TPS:

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Figure 2.2 The Virginia Mason Medical Centre Strategic Plan (IHI, 2005)

The model developed by sending the senior executive of the hospital to Hitachi air conditioning plant in Japan. By deciding that the manufacturing line has commonality with healthcare in concept of quality, safety, customer satisfaction, staff satisfaction, cost-effectiveness, and range of complex process to deliver product, Lean thinking used as improvement strategy. The main process that been common on all the improvement made in the hospital were through selecting the core product, and the process that support that key product, listing and involving the responsible people to deliver those process in Kaizen event, map the current state and remove waste. As IHI (2005) explained the six area of VMPS focus on:

1. "Patient First" as the driver for all processes
2. The creation of an environment in which people feel safe and free to engage in improvement including the adoption of a "No-Layoff Policy"
3. Implementation of a company-wide defect alert system called "The Patient Safety Alert System", from the concept of Toyota where they stopped the line in case of quality defects
4. Encouragement of innovation and "trystorming" (beyond brainstorming, trystorming involves quickly trying new ideas or models of new ideas)
5. Creating a prosperous economic organization primarily by eliminating waste
6. Accountable leadership

It is claimed the implementation of Lean proposed the benefit of saving \$1million for not building an additional hyperbaric chamber and \$6 million for new surgery suites that were no longer needed as working on elimination of waste been applied. Within the implementation all employees required to attend the Lean training as introduction. Between 2002-2004, 175 Rapid Process Improvement

Weeks (RPIWs), as an intensive week of employee analysing processes and propose, test and implement improvement been carried forward, and the result were as below:

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Figure 2.3 Results of 175 RPIWs at Virginia Mason Medical centre (IHI, 2005)

Within the proposed changed culture, becoming customer focus rather than internal focus and process driver rather than expert-driven highlighted as key concepts in Lean thinking been used in Mason. From a process perspective, it is described as perfect process needs to be fit in:

- Valuable i.e. creates value for the customer
- Capable i.e. produces a good result every time
- Available i.e. produces the desired output, not just the desired quality, every time
- Adequate i.e. does not cause delay
- Flexible and linked to continuous flow (IHI, 2005)

And not being able to deliver within these dimensions is recommended that produces the 7 specified Lean manufacturing wastes.

The goal at Virginia Mason is specified to design the system and its processes around the patients' needs rather than around the needs of providers and staff. However, in all improvement none of the customers were involved, and reviewing all the improved cases in different area of the hospital approved the fact that the improvement are made based on failure demand, i.e. a reactive approach to improve the situation when the failure on delivering the service is happened, that's where the staff knowledge from what they have encountered as failure been used.

Meanwhile, within the UK, NHS Institution for Innovation and Improvement shared a toolkit in managing productive wards aiming to release time to care. The toolkit as it demonstrates the 18 steps it shares the best practice on each step, as an example of actual usage in the hospitals. While the toolkit works towards preparing a communication opportunity and allocating time for staff through fixed meeting to discuss on specific subjects, it make the point for working as part of team. For realising how much time is spent on direct patient care, methods like activity flow, video waste walk, and interviews been suggested. The output of this been shown as a 7 type of waste in ward. For instance as NHS (2008) toolkit suggested an overproduction waste been highlighted in ward on

requesting unnecessary tests from pathology that are not required. Following to that 5S been suggested to re-organise the ward. The people who are suggested to be involved are Nurses, Domestic, Auxiliary, and Healthcare assistant staff as well as external staff as appropriate. Progressing to time the activities within the process before mapping the current state, and classification of the incidents within the activity and get a better understanding of the repetitive occurrence of it, would help to map the current process more accurate. Reviewing the current state and making suggestion for future state, and prioritizing the improvement based on cost and benefit as well as dividing the ones can be done within the ward and the ones require external help can lead the team to action plan. Even if the steps are put in sequence, but after the solution and plans for improvement were made the steps turn to introduction of tools rather than a sequence of how to implement Lean thinking. For instance using 5-why's, Spaghetti diagrams, Audit planning. The overall review of the toolkit shows as it helps the staff to understand how the system is working and how they do react for serving the patient directly it is aligned with Lean thinking for start, however not involving a wider stakeholder within the Kaizen event meeting would only give them data as far as the specified 7 wastes by Lean manufacturing.

2.6.3 Lean thinking implementation in Service process within manufacturing environment

The introductions to many service marketing textbooks emphasize the importance of service in the manufacturing sector (Rust et al., 1996), a profound change towards a service orientation, to the improvement of customer service and implementation of an efficient delivery system for goods (Mathieu, 2001). Resta et al.(2015) explain this phenomenon as servitization for companies that are beginning to move beyond manufacturing as a sole source of profit by offering integrated bundles of physical goods and services.

As product-service systems extend the focus beyond manufacturing operations, it is necessary to reconsider the Lean approach, in this instance in the context of service operations (Resta et al., 2015).

In this section two cases are reviewed; the product-service system of the Toyota Motor Italia (TMI) the headquarters of Toyota in Italy (widely regarded as the best-in-class Lean producer with the development of TPS), and the second case an improvement made on quotation process within a manufacturing company.

Based on the Baines et al. (2009) framework and Roseta et al. (2015) investigation the Lean operation offered within the TMI product-service system:

- Utilizing standard processes and use of proven technologies

- Use spare capacity and level schedule to support continuous flow
- Service facility tend to be located optimally with the needs of the customer in mind
- Aim for product availability, by reducing lead-times and then by increasing reliability of the product through high service levels i.e. high customer orientation
- Consist of a core team of multi-skilled and multi-tasked operatives, both in-house and in-field, who have good product knowledge and understanding of customer value creation
- Maintain system quality control in production, as well as to maintain product quality during operation in the hand of the customer
- Tend to offer standardised yet customisable products with a variety of choices of supporting services
- Focus on customer value which requires close contact with customers

The investigation highlights the importance of 'value' realisation from customer as well as managing variety, and quality, while internal quality and cost is maintained i.e. keeping the efficiency high while the effectiveness is maintained within service and product.

The second case, 'quoting process' links the manufacturer, customer and outside supplier, and it affects price determination for the product. Lean principle suits very well in the context of the price quotation process (Knill, 1999). The Lean thinking improvement has been applied in a quotation process within a manufacturing company based on Buzby (2002) by going through the steps of:

- Estimating the most recent trend of demand pattern by checking the cycle time of receipt to receipt time
- Calculate the Takt time by calculating the actual number of minutes available for quoting in each working day
- Divide the quoting done by general manager and the ones done by quoting team to find the total time allowed for completing a quote
- Reduce the paper use by sending the request by email or online RFQ on the web, which leads to cost reduction in quoting process
- Reduce the waiting time by using the prioritisation and control over the waiting time
- Coordinate with outside vendor i.e. supplier of the manufacturing
- Collection of shop floor data for accurate labour costing

The approach taken to the improvement is more efficiency based, while it removes the waiting time within the process, there is no step for making sure the quality of providing the service is met, rather than having shop floor data for labour costing.

2.6.4 Lean thinking implementation in Public sector; - Council and HMRC

Public Sector organisations over the past few years have experienced a rise in focus of the use of business process improvement methodologies, particularly Lean and Six Sigma (Radnor and Boaden, 2008). The two recent examples are Neath Port Talbot, Blaenau Gwent Country Borough and Portsmouth City Council (Seddon and Caulkin, 2007, Zokaei et al., 2010) and HMRC (Radnor, 2010b). The evaluation of Lean implementations in Scottish public sector organisations highlighted the following tangible outcomes (Radnor et al., 2006, Radnor and Walley, 2008):

- Improving service performance in failure demand from 82% to 15% in four weeks.
- Improving processing times by two thirds in one local government department.
- Achieving more work in less staff time.
- Bringing services up to a standard.
- Reduction in staffing and costs of 105 person reduction in manpower and £31m budget saving in 10 months.

Within the implementation in Council, like any other improvement projects, team was established with participating of service manager and senior leaders. Senior leader played a role of listening to demand by asking customer and staff in frontline on what is important for them and what stop them to do their job. For studying the current nature of the current performance external consultant provided training to the team on Lean and system thinking. Through the 'Check' stage (Zokaei et al., 2010) the real purpose of the service from customer view point got questioned and the flow of the service and highlight the conditions that stops the flow. As in System thinking, the waste is from the system condition rather than the fixed 7 manufacturing wastes, it is suggested that look for a reason within system condition to find the waste. By doing so realising the target, procedures, controls, authorisation requirement and IT system was highlighted as the reason. To minimise the waste, in 'Plan' stage (Zokaei et al., 2010) the service was redesigned. For implementing the plan in 'Do' stage (Zokaei et al., 2010), new process, measures and methods was integrated for releasing capacity, ensure management roles add values to the new system and make sure system is capable of monitoring the service delivery.

HMRC, case back in 2007 review revealed despite the nearly £10 million that was spend on the project of introducing Lean to taxation, the result was an increase in errors in the first six months of operation. As it's published in National Audit Office Press Release "£157 million had been overpaid by 540,000 taxpayers (Seddon, 2008)". Seddon (2008) further argues "HMRC is a good example of failure to implement Lean manufacturing in service as the system started to produce errors after proposed improvement". Not having an insight into what 'customer value' in service and their

expectations, following by not having clear understanding of the current service areas and demand ended up to failure. However as Bowen and Youngdahl (1998) suggests, Lean service can be present when certain principles could be discerned in an organization such as flexibility and responsiveness, focus on individual customers, value-chain integration and disaggregation, empowerment of employees and teams, knowledge management, and networked organization. More recently, Radnor and Osborne (2013) in their article 'Lean, a failed theory for public services?', emphasis that Lean has real potential to be a powerful engine for the reform of public services, and the reason for any defective result of Lean implementation is because of the focus on technical tools without understanding of the Lean principles and the underlying logic and theories of service management.

In result wider variables require to be considered for an effective improvement. And as Osborne et al. (2013) highlights, there is a need of further research in key areas of;

- First, to test and refine the concept of a public service-dominant logic, within which the public service-dominant theory of Lean is embedded
- Second, to explore the concept of end-user value as the key performance measure for public service delivery, rather than internal efficiency
- Third, to explore the links between the internal processes of public-service organisation and their impact upon external end-user

In order to achieve the best potential outcomes the concept of 'co-production' in addition to all the specified variables in the public service require to be taken together, this can then provide public service-dominant Lean that is truly fit for purpose to drive a successful public service delivery.

2.6.5 Lean thinking implementation in Universities

Among the process in each organization, there are always few processes which can be considered as fundamental process. For instance, in Manufacturing, Product development, Manufacturing (i.e. Material processing), and Logistics can be distinguished as fundamental. Allen (1999) believes the predominant model in HE is a combination of:

- Academic research
- Teaching
- University service

The "Academic research" can be expanded to "Business Consulting" process. It has been a great involvement of academic researchers in industry either as a knowledge transfer or as a consultant. This research will concentrate on 'Service' section of the HE to be able to offer more precise and focused result.



Figure 2.4 Fundamental processes of HE

Education sector had its unique characteristics which do set it apart from other industry sectors, but it is close to Healthcare e.g. Hospital. Yet, however, the analyses of different sector and their result can offer a useful insight to achieve higher performance.

In common with other service environments, Lean thinking has very rarely been applied to universities and, in comparison with manufacturing environments, universities are in the early stages of improvement activities (Hines, 2007). However, there is much evidence to show that the application of Lean in public sector service environments can be extremely beneficial leading to improved processing times, improved service performance and 'achieving more with less' (Radnor et al., 2006). Much has been written about U.S. Institution's endeavours in this regard, such as Moore (2004), Salewski (2009), Tischler (2006), Emiliani (2014), but confirming the findings of as Hines (2007) suggested these examples concentrate on improving quality, cost and delivery through a variety of Plan, Do, Check, Act cycles within the value stream and have yet to evolve into full strategic and operational value systems.

As it has been specified in organisational categorisation section, HE is an "unconventional" system, while Lean has been implemented within conventional organisations (refer to table 2.4), and as Hines(2007) specifies it as relatively stable in terms of producing high volumes of goods of limited variety. Therefore, implementing a Lean improvement will be associated with particular challenges. In addition the HE service organisation has areas according to Bateman (2007), which builds its uniqueness as a system even further:

- Great variety of the services it provides
- Complicated and dislocated "bureaucracy" management structure
- Strategic vision needs to incorporate three distinctive aspects of Teaching, Research and Innovation which can be in conflict particularly for resources
- Slow response to market
- Few people with parent organisation, those are more likely to identify with Unit, Centre or school.

It is increasingly evident that the academic environment is harder to change than many conventional Lean environments (Hines, 2008).

However, the work undertaken demonstrates success of the applicability of Lean within the health sector, which in turn implies that due to a number of parallels with the educational sector, Lean can become a suitable candidate towards application in this environment (Martin, 2012). The parallel can be summarised as multi-stakeholder, the variety of the service, unpredictability of demand and the fact that customer is within the process of delivering the service.

As highlighted earlier on, in table 2.3, HE service has a variety, and within this variety large number of student needs to be dealt with. The multi-stakeholder and variety range of services can make the service management complex. HE although deals with a large number of students, each student have a distinctive route through the system via the vast range of different courses delivered by numerous individually schools and centres (Hines, 2007).

One of the earliest examples of Lean principles being used in HE was to apply to the design and delivery of the courses process, Emiliani (2004) specifies the reason behind the application as:

- To improve consistency between what was taught in the course and how the course was taught; and
- And in result as the correct application of Lean principles and practices normally results in higher customer (i.e. Student) satisfaction

Even though, the application of the Lean principles has been applied within HE, but it is mostly in academic section and very localised and specific, such as Part-time student course content improvement. It has been well mentioned by Emiliani (2004) that, however applying Lean principles and practice to courses alone may not result in significant improvement, as the instructor's speaking ability, course content, methods of analysis, overall impact and related student services are also important determinants of part-time student satisfaction. This indicates a requirement for more holistic approach from improving the quality of course content towards the improvement of service improvement.

One of the operational steps adopted for education is from Emiliani (2004):

1. Identify the customer
2. Customer value: visual class syllabus, anonymous feedback
3. Eliminate waste
4. Root-cause analysis: 5 whys, Fishbone
5. Scientific method: standard work set of instructions for assignment, visual controls and show example of errors
6. Load levelling: rather than conducting a midterm or final exam, which is essentially batching information, student receives the weekly assignment

7. Visual control/ course remembrance; a way to communicate between departments and in common language
8. Kaizen; The concept of "Kaizen" or continuous improvement within the customer service, application process, and open days, etc.

The improvement, been aimed based on who has been specified as 'end-use customer' in part-time course case i.e. Students and their employers', following by asking for their value-perception. Because the Employers, often do not typically specify the value they expect to receive, and on other hand business school personnel will not seek an understanding of value from the employer's perspective this would lead to a poor understanding of value expectation. Within the case of Booz Allen University (Doria et al., 2003), when the value perception of Business from Business school got investigated the result included:

- Stronger writing, public speaking, and team-building skills;
- More courses in leadership and managing human resources;
- Differentiation (i.e. allowing students to focus on a particular industry, rather than exposing students to many different industries);
- Learning how to apply the scientific method to business and management problems;
- Learning how and when to use formal root cause analysis methods; and
- Integration of business activities across functions versus silo-based pedagogy (i.e. discrete coursework in finance, marketing, operations, strategy, etc.) (Doria, et al., 2003).

The knowledge gained from customer demand requires a system which delivers the demand (Seddon, 2008). Whereas the approach suggested by Emiliani (2004) covers the operational side of improvement rather than questioning whether the main purpose of course being delivered and whether it is delivering the expected demand fully. The operational approach is delivered by using Lean techniques and tools (e.g. Continuous improvement, Five-S, JIT, Load levelling, Respect for people, Standard work, and Visual control) as it been explained in more details in table 2.12:

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Table 2.12 Applying Lean principles and practices to courses (Emiliani, 2004)

Aligned with the operational approach with using tools and techniques to the Lean implementation to HE 8 wastes described by Martin (2012):

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Table 2.13 The eight wastes associated with working environments (Martin, 2012)

The other approach that been taken by Hines (2008a) is by not only looking at Muda(waste) but also looking at Mura (unevenness) and Muri (overburden) and their linkage for understanding the problem and issues with the service better. The study been taken forward at Cardiff University by reviewing the effect post graduate starting time has to the overall service provided to customer. As nearly all the postgraduate courses start in September at the same time as undergraduate courses, this cause a huge traffic in administrative work i.e. Mura leading to Muri.

Hines (2007) took the implementation of Lean thinking to both strategic and process level of the system:

- Strategy Development and Deployment; which emphasis on understanding and analysis of the current strategic situation, the issues and problem that exist, and the need for change. The activity has been taking place in Cardiff University's Strategic Development and Planning Registry department. The initial step was to understand the university's core value and strategic aim and then through a series of workshops with key stakeholders, assisting the development of comprehensible purpose statements which articulated their strategic position. With the result of using this in strategic plan
- Process or Operational (Purchasing process); the result of investigating the current purchasing end-to-end process revealed that the process is lengthy, complex and non-standard across users. The project is therefore focused on working with key users of the process throughout the University to re-design the purchasing process and create a simpler and user friendly system. The workshop started by involving all the functional team to identify all of the process steps, and develop the future state. Following by developing the action plans to put in place the more efficient processes.

The proposed cases showed two approaches to Lean as C.I (RIE) and the other one wider perspective of strategic approach, regardless of the approach taken both use project improvement as a predominant driver to deliver business improvements. Being operationally innovative and able to deploy new way of offering service can out-operate competitors. However, as Hammer (2004) specifies, operational innovation should not be confused with operational improvement or operationally excellent; i.e. ensuring that the work is done as it ought to be to reduce errors, costs, and delays without fundamentally changing how that work gets accomplished.

At St Andrews University Lean activity has been done in Finance, the Library, Registry and Estate. The recent projects include:

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Table 2.14 The impact of Lean at the University of St Andrews (Diamond, 2011)

The other current case of Lean thinking project applications within HE is within the University of Central Oklahoma with initial focus on administrative processes. The reason for running the project been specified by Moore (2004) as university faced significant financial issues; 15% budget reduction, with not having a significant revenue increase expected in the foreseeable future. In addition to limited funding, ineffective administrative processes were contributing to employee job dissatisfaction and low productivity levels (Moore, 2004). The primary focus of Lean is the identifying and eliminating waste from the product or service provided (Moore, 2004). The amount of non-value added administrative processes distracted the staff to focus on customer service. The improvement started by initiating a focus group with campus constitutes to develop a list of priorities for process improvement. The result of the initial survey highlighted the majority of the complained were around the non-value-added activities.

While Mark Nash of Argent Global Services (Nash and Poling, 2008) and others had used Lean in non-manufacturing venues since 1988, it had never been applied extensively in Higher Education (Moore, 2004). In result they started to design and develop the initiative on campus known as 'Lean University'. Training was provided to all administrative staffs on a one-day introductory Lean class. Moore and his team started the improvement by:

- Prioritizing issues and opportunities looking for possible pilot projects and other areas where immediate attention was necessary to improve customer service, based on;
 - 1) Number of complaints regarding delays in work order completion and
 - 2) Impact of improvement on the whole campus, encompassing all divisions.

- Training to all administrative staff, during the training sessions the current and future state map process being created
- VSM maps visually illustrate the process for employees, first in the current state (as it is now) and then in the future state maps (defining priority changes).
- As quickly as an initial project is completed, the results are reviewed (as shown in table 2.15) and efforts are being made for continuous improvement in the affected process.

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Table 2.15 Review of the result before and after Lean implementation (Moore, 2004)

Hines (2008) categorizes changes applied through Lean implementation within the HE improvement to certain areas such as:

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Table 2.16 Key changes in Universities with application of Lean (Hines, 2008)

Aligned with all other attempts for Lean implementation in HE, Professor Radnor reviewed over 5 different HE (Cardiff University, Nottingham Business School, Portsmouth Business School, The University of St Andrews, and Warwick Business School) and based on each project, there has been a case studies made. For some universities the scope of the Lean implementation increased from Business Schools to University wide. The Lean benefit undertaken across Business Schools and Universities in the UK has been mentioned as:

- Creating an understanding of the need to change
- Revising processes and practices which had been untouched for years
- Engaging staff to enable them to challenge and question their working practices (Radnor and Bucci, 2011).

The report by reviewing the universities indicates “for customer value to be increased in all elements of a process there is the need to focus on end-to-end processes. Given the complexity and size of all the organisations involved in this study, end-to-end processes cut across departments and had several areas of responsibility and control. Therefore it was not surprising to find that there were no examples of complete end-to-end process improvements in any organisation” (Radnor & Bucci, 2011). Professor Radnor on her report in ABS (Lean in Business Schools and Universities 2011), has introduced ‘House of Lean for Public Service’. The priority been given to “Understanding demand and capacity” and later on to “Understanding Customer requirements”, but nevertheless both been mentioned as platform for implementation of Lean. However, in the report the key point on the house of Lean for Public Service is mentioned to start where is right for the organisation and give it a go to get the opportunity to not just do more for less, but better for less. More over the review highlights “The concern is that there are assumptions regarding the requirements and that the ‘voice of the customer’ has not been clearly articulated by direct involvement in Lean improvements, except in one organisation” (Radnor & Bucci, 2011).

The House integrates the technical and culture aspects of Lean as shown in figure 2.5, throughout with them feeding into each other in order to achieve a whole process, value chain or system view, embedded improvement behaviours and stable robust processes (Radnor, 2010).

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Figure 2.5 House of Lean for Public Services (Radnor, 2010)

While the ‘House of Lean’ put emphasis on understanding demand and customer requirements as its initial steps, but it does not introduce a formal process for determining stakeholders’ expectations. as Radnor (2011) mentioned ‘the house integrates technical and culture aspects’, i.e. while there are positive points on its approach on different set of tools that been used in projects and training, as well as opportunity to sell Lean to senior managements, it does not offer a structured method for investigating real value for the service from the stakeholders .

Radnor and Bucci (2011) by reviewing the Lean implementation in UK business school and universities, confirmed, “There is little doubt that the Lean programmes undertaken in Higher Education have had significant impacts within the organisations that have undertaken them.” However, meanwhile they emphasis Lean implementation in HE is in its early days i.e. there is a lot of opportunity and much to learn from other public organisations.

The overall review of the Lean implementation in the secondary cases shown that having the strategic level development in place prior to operational improvement would help to facilitate more support and help to set core value and strategic aim in place for required change, however the RIE has been used as well in operational level.

- Reviewing the cases of Lean implementation from secondary research has shown there is not a single methodology for Lean thinking in service and specifically in HE Service. Call centre in case of system environment is different from other service industries reviewed in this section, but as their failing point was on focusing only on efficiency rather than effectiveness the case is included.
- While everyone like to use the Lean philosophy and improve the culture but for different reason the preferences is to overcome short challenges i.e. project based improvement and based on that Kaizen event are the most common method to be used. However, because driver of projects are most of the time cost reduction, more often effectively means cost effectively, rather than customer effectively this would carry the danger of losing track of Voice of Customers within the improvement projects. It should be clear that effectiveness of the project is through stakeholder involvement, as the value can be identified within the service through their expectation.
- The researches are more literature based and the real case-study, which has been followed thorough has not been published yet, for instance one which is called Lean University by More and Nash (2004), being mentioned in Hines (2007) article but not published or available in the public domain.

While the literature is reviewed is in this section, later on in this research models and approaches will be studied and reviewed in more details.

2.7 Value identification in Lean thinking

The definition introduced by Womack and Jones (2005a) “Lean consumption” found to be the approach from the Lean management developed for managing ‘service’ from customer perspective

to facilitate the value identification. It suggests that a Lean provider should deploy highly trained personnel who not only solve the customer's specific problem, but is also identifying its systematic source by seeking the root cause of the problem somewhere up the value stream. The method suggested to do so is by mapping the consumption parallel to the provision map, and eliminate the 7 wastes (i.e. muda).

For instance on the same example that Womack and Jones (2005a) raised for a car service, where the on time delivery of service from the point order is placed into the delivery is the value to be delivered and any activity which does not align with the value should be eliminated.

Mapping the consumption process parallel to provision service map can highlight:

1. What are the steps that a customer goes through to get the end service
2. To what extent the activities being passed over to customers for more streamline process for service providers
3. Potential waste in the process based on selected Value

The third point on 'potential waste based on selected value' selected value, as described earlier in Lean thinking principles from Womack et al. (1990), should indicate the Customers Value within the purpose of service being delivered. The time it takes from customer putting order in, till the time the customer gets the service contains different steps of activities which customer is involved in some as well, removing the activities which does not relate to the end service help to streamline the service process, but it does not help to specify the customer requirements i.e. value. Although Ohono specifies (Bicheno, 2012) the main aim is "to reduce the time from order to cash", but the way to sustainably reduce this time is more important and makes the difference. As Reichheld & Sasser (1990) mentioned quality is perceived within the service, this would make managing the value identification harder.

To manage an improvement within the service the approach can be in different levels:

- Non-Lean practitioners resolve "inefficiencies"
- Beginner Lean practitioners solve problem by "removing waste"
- Experienced Lean practitioner improve the "whole system" (Bicheno, 2012)

While improving the whole system require an insight on how the system works and what is the purpose of the service, resolving isolated inefficiencies would not deliver long-term sustainability, competitive advantage and stakeholders satisfactions. In addition removing waste without understanding the system environment as shown by Seddon (2008) cannot deliver an effective service, and the continuous improvement concept (Radnor, 2010).

The critical requirement for changing and improving the whole system is to understand why the service is in place from a stakeholder perspective (Womersley et al., 2001). The requirement for tools, framework, or model that can close the gap between philosophy and practice is inevitable. Using these tools, tomorrow's organisations will have to become much better at matching internal quality management capabilities with a strategic focus that consistent with how customers see the value (Woodruff, 1992).

Currently, Value is being seen as a process based with better processes leading to better value for internal staff (Radnor, 2011) as well as the customers. Radnor and Bucci (2011), highlighted the point that "value is being seen as only process based with better processes leading to better value mainly for internal staff", which means the concept of delivering value to customers as well as internal staff, i.e. stakeholders of the service (both customer and staff) needs to be developed further. In agreement with Radnore & Bucci, Balzer (2010) specified his opinion of student as customer going through any of the process (e.g. admitting student, adding or dropping course, advising student, and hiring faculty) is they are not designed for customer as for instance registration system that makes students wait in line- a line to register as a student, more over a line to see an advisor, a line to purchase course books, and a line to get an ID card, that's where and all at times designed to be convenient for the school rather than the student/customer. Regardless of what University set up for its mission, the customer in case of not being happy would consider other options from looking for an alternative options such as an alternative program to not enrolling (Balzer, 2010). This will have a direct impact on losing the grant. One of the success factor of the Lean as a business improvement methodology is defined by Hines (2010) as a way to focus everyone in the same direction based on what adds value to their internal and external customers i.e. all stakeholders. This shows the improvement of HE service is required not only because of the budget cut but also because of hug lacking concept of being effective in delivering the services.

- As service has multi-stakeholder, and value comes from the stakeholders, it is required that for identifying the value for service Voice of Stakeholders (VOS) is retained in improvement.

2.7.1 Understanding Stakeholders Value

In HE service as Radnor & Bucci (2011) suggested "students are customers because of their transformation is HE product, but they are also stakeholders because they have long engagement with the university", which make the point that consumption and provision in the service happens simultaneously. Womersley et al (2001) in LAI report defines 'customers' as a stakeholder who is recipient of a product or service which is produced by the organisation, regardless on whether the

customers are internal or external, they can be the reason the service exists or a functional area or department within the organisation exists. Moreover, stakeholders are those who have an interest in an organisation, its activities and achievements (Womersley et al, 2001).

While customers of HE service are stakeholders of the service as well, Radnor (2010) emphasis based on Lean thinking expectation that to deliver value across the organisation it is critical to involve people, who are an inherent part of the system delivering the service. Excellent organisations design, manage and improve process in order to fully satisfy, and generate increasing value for customers and other stakeholders (European Foundation for Quality management, 2003). Womack (2011), in his recent book, 'Gemba Walks', describes the strategic process pattern visible in world class companies are:

- Process to be driven by customer expectations
- Maximisation of opportunities for interaction between people
- Decision to be made by closest to the work
- One-time entry of data, accessible to all who need to know

One of the boundaries to successful implementation of business improvement technique in public sector specified by Radnor (2010) is to "not understanding the process at either the front line or across organisational boundaries". Halachmi (1996) suggested "Getting consent to change externally owned process is a huge task and can involve collaboration with many stakeholders".

Even though, HE Service might fit in the business model description for Lean philosophy, but as Oliver (1994) described the core characteristics of a Lean organisation are:

- Team- based organisations involving flexible, multi skilled operators taking a high degree of responsibility for work within their areas
- Active staff problem solving structures, central to continuous improvement activities
- Lean operations, which force problems to be surfaced and corrected
- High commitment human resource policies, which encourage a shared destiny
- Close, shared destiny relations with suppliers, typically in the context of much smaller supply bases
- Cross-functional development teams
- Close links to the customer

More emphasis on the team working with high commitment and problem solving culture as well as link to customer, supplier, and in general stakeholders is required. The main reason for that is to have sustainable Lean organisation. This can be the point which HE Service, as specified in table 2.4,

struggles in as the link to stakeholders from Lean philosophy is required to be in place, but HE with its conventional system structure, does not have a clear understanding and involvement of stakeholders in place, as Venkatasubramanian (2004) describes the HE conventional structure must change to cope with challenges from learners. And to emphasise the importance Hines (2008) specifies leadership plays an important role in the organisation as sustainable organisation leaders. Ostensibly, organizations are formed to serve particular needs in a given society, but not all do so (Smudde, 2011). In fast changing global business environment, to gain competitive advantage organizations must continually adjust their business strategies, and vision to fit the environment and expectations. As the world becomes increasingly global and interconnected, the number and influence of stakeholders are increasing, thus creating an even stronger need for this field (Bryson, 2004). In the UK, the trend to modernize government and public services has led to a greater need for the non-profit sector to establish and maintain relationships with clients, suppliers and governments (Myers & Sacks, 2001) i.e. stakeholders. Sustainable development requires that a company's performance be valued positively by the stakeholders (Kaptein & Tulder, 2003). Nevertheless the stakeholder needs and wants are dynamic and change over the time. For a Service firm it is critical to cope with this problem (Liu, 2010).

In global competition, stakeholder and specifically customers are more demanding. Therefore, providers have to react faster for delivering goods and services to the customers at improved quality and lower prices (Alp, 2001). Nevertheless, depending on stakeholder value the area of improvement can be different.

Treacy & Wiersema model (1996), as shown in figure 2.6, is based on the value disciplines of market leader propose the creation of value needs to be through three dimensions of:

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Figure 2.6 The discipline of Market leaders, (Treacy & Wiersema, 1995)

They discuss for operational excellence it is needed to focus on reducing costs, improving effectiveness, and for the product leadership need to focus on product innovation and speed to

market, and on customer experience need to focus on developing a better understanding of customer needs and preferences. Creating value through the model seems to be a trade-off which produces an inherent tension. Businesses have a role to play in improving the lives of all their customers, employees, and shareholders by sharing with them the wealth they have created (Emiliani, 2004a), i.e. business is responsible beyond shareholders, and towards stakeholders. In a service where it is dealt with multi-stakeholders, customers who are part of the delivery of the service, and the intangible end-product, it is required to have a wider view and not only focus on end-customer, but also the stakeholders (Radnor & Bucci, 2011). An important difference for public service is in Systems Thinking which means the need for considering and managing 'value' across and between organisation, this means people are critical as they are inherent part of the system delivering the service (Radnor, 2010). Hines (2004) emphasises the point by specifying that human aspects elements are, key to the long-term sustainability of any Lean programme, regardless of the industry sector.

The field of stakeholder management can be traced back to Strategic Management: A Stakeholder Approach by Freeman (1984). Freeman (1984) argued that stakeholders are a significant component of an organisation's environment. Essentially the stakeholder concept holds that an organisation occupies the centre of a network of relationships that it has with assorted interested parties (Neville et al, 2005). While Freeman sets the agenda for what is known as 'Stakeholder theory' in his book; - "Strategic Management: A Stakeholder Approach (2010)", emphasises that for any business to be successful it requires to create Value. The approach from Lean for Value, is while it is critical it is mainly defined by customer, however, in the review Radnor (2010) for Lean in public sector, she highlighted as in public sectors other forms of Value may well exist, and therefore may be the recognition of Value and drivers towards it should be the focus, rather than just the single Customer, for example "adherence to policy, laws and equity (Radnor, 2010)", strong relationship with suppliers (Bicheno, 2004), engaging staff (Hines et al, 2008a), and all members within the system (Womack & Jones, 1990). Prahalad and Ramaswamy (2004) highlight the value co-creation opportunities resulting from the transformation of customers from "passive audiences" to "active players". Normann and Ramirez (1993) appear to be the first authors to point out the importance of non-customer stakeholders and their potential to work together to co-create new forms of value. Laczniaik (2006); Fraw and Payne (2011) also argues that by looking at the business system as a whole, all stakeholders may potentially be viewed as co-participants in the service provision.

Value cannot be created in isolation from stakeholders, yet within the exchange paradigm, the primary focus has been on value-in-exchange between the buyers and sellers (Lusch et al., 2006). Value creation needs to be for customers, suppliers, employees, communities, financiers, and

shareholders and in result for all stakeholders (Friedman & Miles, 2006). The main point is not to look at any of the stakes or stakeholders in isolation. With changing and challenging market condition, goods and service providers have worked to become more customers centric (Gebauer, 2011). In addition, Preston (1999), emphasis on the fact that organisational wealth can be enhanced by appropriate linkages, with stakeholders. Despite the rising interest in stakeholders, effective stakeholder involvement is complex, problematic and often underestimated (Friedman & Miles, 2006). Fraw and Payne (2011) emphasis, A key task for managers is to consider the co-creation of value propositions with each stakeholder market relevant to their organization 'achieving this task requires extending knowledge sharing and dialogue activities, understanding resulting stakeholder experiences and adjusting the value proposition to reflect new knowledge and the usage experience'.

The service can be quite different between those from the provider perspective and those from the customer perspective (Liu and Wang, 2010). As Liu explains the service providers are mainly interested in resource planning, i.e. availability and efficiency, while customer mainly focuses on their experiential satisfaction (Edvardsson et al, 2005; Liu & Wang, 2008). Being focused on either only on service provider expectation or customer experience can only cover specific stakes or stakeholder in isolation, however, being able to consider all stakeholders at a time will allow the business to create value that no one of them can create alone (Liu and Wang, 2010).

Mitchell et al. (1997) classified stakeholders against their possession of power, legitimacy and urgency. Stakeholder map has been used widely in managing multiple stakeholders, in which the stakeholders get classified based on one, two or all three attributes:

- The stakeholder “power” to influence the firm
- The legitimacy of the stakeholder relationships with the firm, and
- The urgency of the stakeholder’s claim on the firm (Smudde, 2011).

Doing so approved to narrow down the stakeholder involvement and have direct impact on the end result and decision making for a solution. Power versus interest grid technique by Mendelow (1987) is used as method to choose stakeholder participants. These grids array stakeholders on a two-by-two matrix where the dimensions are the stakeholder’s interest in the organisation or issue at hand, and stakeholder’s power to affect the organisation’s or issue’s future. The categories can be classified as:

- High interest with significant power
- High interest with little power

- Little direct interest, but significant power
- Little interest, and little power (Eden and Ackermann, 1998 and Bryson et al., 2011)

Nutt's research in 2002 based on 400 medium to large organisation approved the reason behind decision failure is poor decision making tactics. As Sage et al. (2014) described "a pre-defined criterion for success might not adequately capture a more emergent, or ambiguous, project vision from stakeholders". Ibrahim et al. (2013) take a step forward and specifies the major notion of the project failure as "Expectation failure" i.e. the inability of the project "to meet its stakeholders' requirements, expectation and value". The three most common mistakes specified by him are:

- Failure prone decision making practices
- Premature commitments
- Time and money spent on the wrong things

And the point he makes as a solution is "if stakeholder interests can be uncovered and understood, the social and political forces that the interests stir up are usually manageable." This raises the importance of determining who to involve in a structural way while making key decision. And in hence, "Failure to attend to the information and concerns of stakeholders clearly is a kind of flaw in thinking or action that too often and too predictably leads to poor performance, outright failure, or even disaster" (Bryson, 2003).

Within this subject, the management of knowledge put emphasis on identifying stakeholders and planning on how to have a communication channels in place, too. Communication is the key to maintaining relationships with stakeholders (Smudde & Courtright, 2011).

Being recognised by Sveiby (1997) that building organisational wealth is both tangible and intangible, Roos (2003) argues that stakeholder management can enhance organisational wealth and that economic benefits can be generated by positive relationships between an organisation and its stakeholders. This is usually referred to as 'instrumental stakeholder theory' and provides a basic rational for the "question of why stakeholder concerns should be considered in the way in which an organisation is directed and controlled" (Hansen & Spitzeck, 2010). However, the instrumental stakeholder theory only emphasis on paying attention to stakeholders who can affect the value of the firm (Jenson, 2001), and by that means the powerful stakeholders (Mitchell et al., 1997).

The benefits of using stakeholder with power from project aspect are (QA-IQ, 2003):

- You can use the opinions of the most powerful stakeholders to shape your projects at an early stage. Not only does this make it more likely that they will support you, their input can also improve the quality of your project

- Gaining support from powerful stakeholders can help you to win more resources, this makes it more likely that your projects will be successful
- By communicating with stakeholders early and frequently, you can ensure that they fully understand what you are doing and understanding the benefits of your projects, this means they can support you actively when necessary
- You can anticipate what people's reaction to your project may be, and build into your plan the actions that will win people's support.

Based on building organisation wealth through stakeholder involvement, a framework was developed by Agle et al (1999) to nominate the stakeholders. The down point on stakeholder nomination is shown to be paying attention only to the stakeholders with "power" of influence to the firm, as the definitive stakeholders and disqualify the rest. The "powerful" stakeholders are the one mainly providing the ultimate service or product, or top managers and in result voice of all stakeholders are not heard and not always articulated by direct involvement (Foster & Jonker 2005). Freeman (1984) claimed that management approaches failed to take account of a wide range of groups who can affect or are affected by an organisation, namely the 'stakeholders'. As a result, low levels of awareness, problems with coordination and bureaucracy, feelings of disempowerment, fragility of common interests, the failure to clarify goals and an unwillingness to make significant changes to current behaviour have been rife among stakeholders (Waligo, 2013).

The other approach is a 'descriptive stakeholder approach', which identifies and classifies the different constituents of an organisation without assessing any value statements regarding the legitimacy of their claims or their power (Hansen & Spitzeck, 2010; Lozano, 2005). Foster and Jonker (2005) argue all the stakeholder for an organisation have power, they might not have power on making decision but they have power in various forms to influence the achievement of outcomes. They further emphasis that "Modern organisations therefore need to recognise that any engagement with stakeholders will raise a number of issues that appear to be outside the realm of "rationality" (as perceived by them) and therefore irrelevant to the proposed action" (Foster& Jonker 2005).

According to Emiliani, (2004), based on the Toyota Production System the philosophy of Lean has become a recognised management system, which is designed to be more productive and deliver better outcomes for key stakeholders such as associates, suppliers, customers, investors, and communities and takes account of whole organisational requirements(Denis, 2010). The cases applied Lean principles within HE highlighted, they are mainly focused on end-use-customer and to make the improvement more efficient feedback from end-use-customer in different point within the

process being put in place. As it has been mentioned (Kaptein & Tulder, 2003) being focused only on end-customer only covers specific requirements in isolation, and the risk of not covering all the aspects is high. Not being able to consider all the expectations, may lead the improvement to the point where the failure/dissatisfaction is allowed so that the re-active improvement can be put in place (Nutt, 2002). Sinha et al. (2010) emphasises in a service environment, it is helpful to define the value of the multiple stakeholders view and ensure these views are considered when mapping. One of the mapping methods for guiding the service organisation through the journey, by creating a picture of the whole story as a high level process, is A3 Route Learning map. Sinha et al (2010) describes the A3 approach further as a tool engenders communication in a manner that leads to decisions based on the data gathered from the people who performed it. Following the use of mapping method in Community of Practice (CoP) within the paper, it is specified “the challenge is to define what the problems are, and how do you know what to improve?” (Sinha et al., 2010). In addition, the end-customer expectation might not be aligned with other stakeholders’ expectation. Failure to take all the stakeholders views into account could lead to poor decision because of incomplete picture (Foster & Jonker 2005; Spitzeck & Hansen, 2010). According to Emiliani (2004) importantly, “improvements must be made in non-zero-sum (win-win) ways, not only to gain support for improvement, but to assure that Lean does not harm any stakeholder”. It is critical to organisational success to handle all stakeholders, as Freeman (2010) argues, in Public sector when they are immersed in the operations of the business, seen as a valuable resource to management with vision and insight about making sense of a complex environment and multiple stakeholder groups, discern new and emerging issues and stakeholders, connect the dots among issues while being sensitive to all stakeholders’ views, and willing to take risks proactively when issues and stakeholders are determined to be legitimate.

In addition to what has been reviewed Six-sigma as one of the mentioned performance methodologies, is utilised to focus on real customer issues, which are critical to quality (CTQ) too. Using the defined methodology called DMAIC (Define-Measure-Analyze-Improve-Control) (Maleyeff et al., 2012). This is a method to assure that the projects, integrates the human (teamwork, culture change, motivation, customer focus, and process (process control, monitoring, analysis and improvement) aspects of improvement (Anthony, 2007b).

For handling and running any organisation, managers require making decisions on three different levels:

- Strategic (Simon,1960; Spitzeck & Hansen, 2010); Long-term, Objectives, resources and policies, aligning organisational direction with organisational goal and respond to environmental change (Vinzant, 1999)
- Tactical; monitor use of resources, performance, knowledge and evaluate potential innovation (Spitzeck & Hansen, 2010)
- Operational (Simon, 1960; Spitzeck & Hansen, 2010); How to carry out day-to-day tasks

Attention to stakeholders is important throughout the strategic management process because 'success' for public organizations -and certainly survival -depends on satisfying key stakeholders according to their definition of what is valuable (Bryson, 2004). In many organisations the tactic of decision making on improvement or any required changes is based on a reactive approach to the situation. As John Thompson (2005) explained in his book as decision-making is a process related to the existence of a problem and it has often been talked about in term of a problem-solving; “A problem exists when an undesirable situation has arisen which requires action to change it” (Thompson, 2005). However, this is against the culture of continues improvement within the Lean philosophy, as waiting for problem to affect the business and then gather data is late (known as waste) as it affects the customer as well as it associates risk of business reputation. Therefore, being proactive and evaluate the value against the activities and the output of the process would be an ideal situation to aim for.

Hence, as successful organisation requires creating Value there should not be any assumption made regarding stakeholders’ requirements, but all stakeholder direct involvement and articulation.

2.8 Preliminary study

Based on St Andrews (2012), and Radnor & Bucci (2011) report many Universities within the UK and around the world are now implementing strategic change programmes aimed at reviewing and developing a culture of continuous improvement (C.I). Even though the research is based on UK HE service, but to have a thorough understanding of the progress the review in this section has been done internationally. The preliminary study was carried forward on:

- A. The available models and frameworks in public domain for Lean implementation in HE
- B. Coventry University Business Improvement training (CUBIT, 2011) conducting initial real world research; that the researcher was involved into investigate the current methods in use for Lean implementation on improvement projects, which is included in chapter 4.

2.8.1 Model and Frameworks implemented in HE

The review of seven models and frameworks of universities who implemented Lean thinking was carried forward in more details against the development of the questions driven by literature review. The universities are selected based on their publicly identified active in literature, towards project improvement within the HE service, using Lean philosophy:

	University
A.	Cardiff University (LERC)
B.	University of St Andrews
C.	University of Minnesota
D.	University of Scranton
E.	University of Central Oklahoma
F.	Coventry University
G.	University of York

Table 2.17 Reviewed universities implemented Lean

In order to structurally study the frameworks and models in the 7 cases, and to understand whether a gap in knowledge on ability to offer improvement based on analytical review of stakeholder expectation exists, a fix set of diagnostic questions (table 2.18) driven from literature review has been developed.

Based on Denis (2010) and Emiliani (2004), Lean is designed to deliver better outcomes for stakeholder by taking account of whole organisational requirements. The emphasis made in literature on importance of involving all stakeholders, and not stakeholder in isolation, at a time which will allow the business to create value that no one of them can create alone. 'All stakeholders' has been referred to as valuable resources and co-participants in the service provision, who can help the managers gaining vision and insight of complex multi-stakeholder environment. It has reasoned further that 'All' stakeholder require to be involved as they have various form of power to influence the achievement of the outcomes. And it was concluded that a successful organisation to create value require stakeholder involvement which will enhance organisation wealth, failure to take all stakeholders views into account could lead to poor decision. Therefore the first question was designed around representing all stakeholders at the outset of improvement project (Table 2.18, question 1).

Following to the benefit of presenting all stakeholder it is emphasised to ensure multiple stakeholder views are defined and considered. By communicating with stakeholders early and frequently it can be ensured that they fully understand the project while they can support actively when necessary. While the management of knowledge put emphasis on identifying stakeholder it also stressed planning on how to have a communication or a formal process to capture requirement. Communication channel and structural method of capturing requirements as a means of defining value from stakeholders' is a key for identifying standard value expectation. In result, second diagnostic question was developed as 'Has a formal process to capture and determine all stakeholders' requirement been used?' (Table 2.18, question 2). In response to the question three categories are defined as:

- Yes; when the model or framework present a 'formal process/means' for identifying standard value expectation
- Partially; when structural process for identifying value is applied but only to 'selected' number of stakeholder, by defining requirements internally and based on past experience
- No; when means of defining value from stakeholders' requirement is informal and unstructured

The fact that getting constant to change externally owned process is a huge task and requires collaboration with many stakeholders, is highlighted in literature. And the concern is greater in HE where the service is cross-functional, which indicates the key for managers is to consider co-creation of value. Achieving this would require extending knowledge sharing and methods to reflect the new knowledge. Co-creation of value requires happening while stakeholders' requirements might nigh be aligned. The major notion of the project failure mentioned as 'expectation failure' i.e. inability to meet stakeholders' expectation and value for service. This is highlighted in literature as failure to attend to the information and concerns of stakeholder, which leads to flaw in thinking or action that too often and too predictably leads to poor performance and outright failure, or even disaster. Therefore, balancing captured requirements from all stakeholders to streamline the value flow in a structured manner is required. In result, the third question was developed as 'Have the stakeholders' expectation been quantified, prioritised, and balanced to streamline the value flow in a structural manner?' (Table 2.18, question 3). In response to the question three categories are defined as:

- Yes; when the model or framework present a 'formal process/means' for quantify, prioritise and balance the stakeholders' expectations

- Partially; when a formal process is used to balance expectation but only to 'selected' number of stakeholder
- No; when requirements are defined based on balancing cost and efficiency, and the remaining expectations are left to be considered in an ad-hoc manner

Literature described that stakeholder involvement not only have direct impact on receiving support from stakeholder and decision making for solution but also the quality of the project. Effectiveness of the project is through stakeholder involvement as the value can be identified within service through their expectation. Depending on stakeholder value, the area of improvement can be different. Stakeholder needs and wants are dynamic and change over time and it is critical to cope with managing existing and emerging needs. In result question four is developed as 'have the defined balanced requirements been used to guide optimisation of service effectiveness?' As Bicheno (2012), described, the level of improvement can differ from resolving inefficiencies to remove waste with the ultimate aim of improving the whole system. Improving the whole system should result an effective service, which lead to prevention of failure demand in service operation i.e. value adding activities be carried out right first time. In response to the question three categories are defined as:

- Yes; when the balanced requirements have been used to guide the optimisation of service 'effectiveness' to ensure meeting existing and emerging need by allowing the interdependencies across the extended enterprise to be in place, while aligning and dealing will all requirements)
- Partially; when only critical interaction of stakeholders within value stream are defined to remove waste
- No; when the aim was set only on 'efficient' delivery and lost sight of stakeholder voice, as they were not able to manage all

1 Have all the stakeholders been represented at the outset of the improvement project?

2 Has a formal process to capture & determine all stakeholders' requirement been used?

- Yes, A formal process has been established for identifying standard value expectation
- Partially, structured process for defining value is applied only to selected/key stakeholder, by defining requirement internally and based on past experience
- No, means of defining value from stakeholders' requirement is informal and unstructured

- 3** Have the stakeholders' expectations been quantified, prioritised and balanced to streamline the value flow in a structured manner?
- Yes, a formal process used to quantify, prioritised and balance the stakeholders' expectations
 - Partially, a formal process is used to balance expectation from key stakeholder
 - No, requirement are defined which balance cost and efficiency, while issues are considered in an ad-hoc manner
- 4** Have the defined balanced requirements been used to guide optimisation of service effectiveness?
- Yes, balanced stakeholders' requirements have been used to guide optimisation of service effectiveness to ensure meeting existing and emerging needs
 - Partially, only critical interaction of stakeholders within value stream are defined
 - No, lost sight of stakeholder voice, not able to manage all, and only ensure efficient delivery of the service

Table 2.18 Diagnostic questions

The four diagnostic questions are designed based on the root definition of relevant concern raised from literature review as the gap based on Checkland Soft System research approach.(refer to chapter 3 for further description of research methodology approach taken). The conceptual model of root definition of relevant concern as demonstrated in figure 2.6.1, shows the potential steps/activities and their logical dependencies. Representing all stakeholders to capture their requirement and balancing their requirement to provide guidance towards service effectiveness.

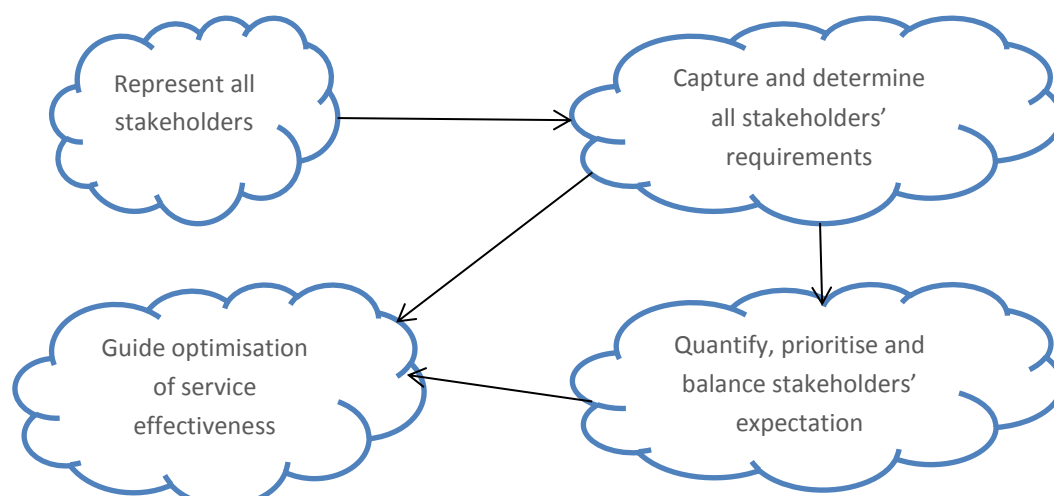


Figure 2.6.1 Conceptual model of root definition of relevant concern

A. Cardiff University (LERC)

Hines et al. (2004) introduces the Lean Enterprise Research Centre (LERC), with a newly-created Lean core team in a client university, aims translating the Lean value system to an academic environment. To do so Hines (2008) believes providing a holistic methodology to transform the organization is required. While he explains that the real change to occur, major mental, transformational shifts need to take place at the upper level of the institution (Hines, 2008), the change in thinking then need to be cascaded down in the organisation.

Hines (2008) has stressed the belief that addressing the top down and bottom up approaches should initiate a Lean transformation in Universities in order to deliver a successful, sustainable transformation. It is also important to realize that within the iceberg's model (Hines et al., 2008) components are all interdependent (figure 2.7). Denis (2006) categorizes Lean improvements in terms of top down and bottom up, stating that bottom up approaches possess the power of the quick win, but they suffer from variable sustainability performance according to Hines (2008). Nevertheless the key is to get the right balance of different implementation approaches. From an investigation of published literature in the broad areas of total quality management (TQM), continuous improvement (CI) and Lean one guiding principle for cultural change and sustained success in CI seems to prevail namely; that it should involve a holistic top-down implementation, with a strong relationship developed between the corporate plan and the 'key' strategies aligned actions (Martin, 2011).

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Figure 2.7 The Lean Iceberg Model (adapted from Hines, et al., 2008).

As the Lean iceberg model shows the engagement of stakeholders is the fundamental part to be considered in Lean implementation. Hines (2008) emphasises the importance of holistic value and lack of current approaches towards using Lean in Universities improvement in his paper, as "while many institutions pursue continuous improvement, and many experience considerable resource

savings as a consequence, incidences of the attempted application of a holistic Lean value system are limited, particularly in the 'below the water level' enabling area of the iceberg".

Research began within the Centre to develop a Lean Implementation model that sought to provide a more concrete, holistic approach to transformations within organisations. Hines (2008) explains the Lean concepts are grounded within Systems Theory and "the model acts as an aide memoir in order to encourage improvement teams to think about the academic organisation as a holistic, interdependent system" (Hines, 2008). Based on the LERC report on system thinking (Zokaei et al., 2010), the improvement started with the external consultant training the senior leaders and team members in the principles of Lean and System thinking. The improvement stages of the model are explained in figure 2.8 (System Thinking 'Check-Plan-Do' Approach) and table 2.18.

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Figure2.8 Systems Thinking 'Check Plan Do' Approach (Zokaei et al., 2010)

In case of Lean got reflected in these 3stages within the System thinking, the report explains further; Some materials have been removed due to 3rd party copyright. The unabridged version can be viewed in Lancaster Library - Coventry University.

Table 2.19 Stages of Systems Thinking Review (Zokaei, et al., 2010)

The check phase, then get explained as more detailed stages:

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Figure 2.9 Check model of system analysis (Zokaei, et al., 2010) & The Vanguard model for 'check' (Seddon, 2008)

Purpose: defining the right purpose for the service from the customer's point of view, this is achieved by listening to demand studying 'what matters' to customer (Zokaei, et al., 2010). Having examined demand on the service and after asking customers face to face what mattered to them the team was also able to identify the steps in the process that were of value to customers linked to this purpose (Zokaei, et al., 2010).

Demand: study and analysis the type and frequency of demand, based on its lead time and branches receiving the demand from, the classification of customer, and cost associated with it.

Ability to meet purpose: the ability of the system is measured against the purpose or what matters to the customers, i.e. meeting the value demand (Zokaei, et al., 2010).

Flow: mapping the flow after extensive study of purpose and demand, this is essential in order to make sure that the improvement process is driven by effectiveness rather than a suboptimal emphasis on efficiency (Zokaei, et al., 2010).

System conditions and Management thinking: in order to redesign an efficient service against the purpose, it is important to understand the system conditions which drive the current performance as well as the managerial assumptions which inevitably underpin the system design (Zokaei, et al., 2010). This is suggested to be done by asking front line staff about what got in the way and stopped them doing a good job? Target, procedures, controls, authorisation requirement and IT systems can be part of the reply (Seddon, 2008).

Plan phase was experimenting to find a better system which, in achieving the purpose from customer's point of view, is also simpler and cheaper (Zokaei, et al., 2010). It is specified in the report that because the report was written during the early stages of the 'Do' phase, full explanation

was not provided rather than the redesign team trying to involve the entire operation team on the specific service in the redesign process. In order to achieve this, other teams were formed with one expert from different areas in each team (Zokaei, et al., 2010). The first phase of the implementation plan addresses the most critical aspect of a Lean transformation, which is to ensure that the strategic mission of the organization is clearly defined, concise and excellently communicated to all (Hines, 2008).

Even though, Zokaei et al(2010) stated in the report that ‘Understanding preventable demand and being able to design the flow against real (value) demand is a basic advantage of the approach’, the review of the model against the diagnostic question reveals:

Diagnostic questions	Yes	Partially	No
1. Have all the stakeholders been represented at the outset of the improvement project?			✗
2. Has a formal process to capture & determine all stakeholders' requirement been used?		✗	
3. Have the stakeholders' expectations been quantified, prioritised and balanced to streamline the value flow in a structured manner?		✗	
4. Have the defined balanced requirements been used to guide optimisation of service effectiveness?			✗

Table 2.20 comparison table between Cardiff University model and the diagnostic questions

The model does not indicate any stage or emphasis on presenting stakeholder rather than emphasising on understanding what matters to the ultimate customer of service. After the demand from customer is defined as value for the service, only the ‘front line’ staff or operational staff gets involved in redesigning phase to deliver the specified value.

Within the model structured process for defining value is applied only to selected/key stakeholder i.e. customer, therefore it is stated that a formal process to capture & determine requirements are used partially. The defined expectation/demand has been quantified and prioritised based on frequency and type of customer demand therefor the model holds a formal process partially, by balancing expectation from key stakeholder i.e. customer.

As the value and value-drivers are solely based on customer existing expectation i.e. value demand and failure demand, the system condition is studied to remove any inefficiency within the service based on defined ‘purpose’ from customer. The model lost sight of stakeholder voice when not able to manage all, and ensured efficient delivery of the service.

B. University of St Andrews

Lean in St Andrews been established with three main goals;- Culture change, Effectiveness (to ensure that all business processes meet existing and emerging needs) and Efficiency (to maximise the use of all resources in the delivery of high quality service) (St Andrews University, 2014).

St Andrews applies Lean in three ways:

1. Project work; includes RIE (Rapid Improvement Events) (Radnor & Bucci, 2011)
2. Training
3. One to one work; working with management level staff as well as staff at all levels

Their proposed Lean project review contains 8 steps;

1. Request; An area of work is identified by a member of the principal's office, senior management, frontline staff members or through an enquiry;
2. Scoping; It is ensured that there are clear goals, the right people involved and any required resources arranged;
3. Planning; with the appropriate people, the project goal, approach, timetable, and any data requirements are reviewed and agreed;
4. Training; when staff is new to Lean or the area additional training is undertaken;
5. Redesign; the group meets for a focused period of time with the authority to create a new process and identify and complete actions required, which lead to a documented new process and an action plan for any further work;
6. Implementation; further actions are taken by the team members;
7. Review; the group meets regularly as required to identify and remove any barriers to implementation
8. Feedback; the project is signed off as completed and feedback is taken on the Lean process as a whole.

The involvement of Customer, Initiator, Sponsor, Lean Team and Project team differ based on the steps (Refer to Appendix 3):

- The customer is involved in Planning, Redesign, and Review step
- The initiator is involved in Request, Scoping and Feedback
- The sponsor is involved in Scoping, Review and Feedback
- Lean team and Project team are involved in Planning, Training, Redesign, Implementation, Review and Feedback

The example provided (St Andrews University, 2014) for RIE, as a method for their most productive outcome, indicates Lean implementation stages as:

- The event begins with a clear management commission by sponsor support
- The current process is mapped using standard conventions such as process mapping by Lean team
- Data about the current process is checked with project team and customer to ensure full understanding.
- Options for alternative approaches to a process are identified and analysed by Lean team and project team
- A future process is designed and implemented by project team
- An action plan is formulated for outstanding tasks by project team
- The project team presents their new process to management and colleagues at a feed out session.
- Follow up events are typically held at 15, 30, 60 and 90 day periods

There is no clear definition for project team members, however the review of available improvement case-studies highlighted the project team are frontline staff member and senior manager.

Meanwhile, in their “Become Lean” guide (2012), set of tools and techniques are introduced to be used within the proposed 8-steps, such as BOSCARD (Background, Objectives, Scope, Constrains, Assumptions, Reporting, and Deliverables), SIPOC (Suppliers, Inputs, Process, Outputs, and Customer), Quad of Aims (Purpose, stakeholder benefits, Deliverables, Measures) to make clear statements of goals (Radnor & Bucci, 2011), Process mapping of current and future state, Nominal Grouping and Matrix Prioritisation to generate ideas for improvement .

Diagnostic questions	Yes	Partially	No
1. Have all the stakeholders been represented at the outset of the improvement project?			✗
2. Has a formal process to capture & determine all stakeholders' requirement been used?			✗
3. Have the stakeholders' expectations been quantified, prioritised and balanced to streamline the value flow in a structured manner?			✗
4. Have the defined balanced requirements been used to guide optimisation of service effectiveness?			✗

Table 2.21 comparison table between St Andrews University model and the diagnostic questions

The model has introduced a way to manage the Lean improvement project in HE in a defined steps, however in case of value realisation from all stakeholders, not all the stakeholders are required to be presented in the project at the outset of the improvement. The planning step includes customer, project team and Lean team to collect data requirement about current process. The other downstream stakeholders only get involved after the future plan is designed and implemented at a feed out session.

There has not been specified any formal process to capture and determine all stakeholders' requirements rather than informal and unstructured frontline staff and Lean team past experience input.

The improvement is identified by a member of principal's office, senior management, or frontline staff member, i.e. issues are considered earlier in project but in an ad-hoc manner. This is while the requirement is not quantified or prioritised but the generated solutions by frontline staff are prioritised, and within the follow up and review events, project team meet to identify and remove barriers for implementation.

There is no indication of requirement for stakeholder involvement within the improvement project in the model, rather than cut off involvement of customer and frontline staff through the project. The sight of all stakeholders' voice within the service improvement project is lost, even though the ultimate aim of all improvement is introduced as an effective and efficient service.

C. University of Minnesota

The project consists of event-driven Lean in a University Environment, which presents 5-step process and emphasises that success in improvement activity will generate pull from leadership.

The 5-step approach is outlined as (Salewski, 2009):

- *Step one;* Find early adopters who have an initial interest or need to improve their processes, while the experience showed eliminating waste is much easier in the more concentrate areas of organisational support;
- *Step two;* Make it clear that “transactional Lean” is different and sometimes more difficult than “manufacturing Lean”. Training materials that internalize Lean principle and educate early adopters is what's being offered as a solution to facilitate the Lean implementation;
- *Step three;* Create and use a central improvement office that will support departmental leaders and early adopters in their efforts to launch continuous improvement activities;

- *Step four*; Once a department is selected to undertake the initial launch of Lean at the university, use Kaizen events demonstrating the capability of Lean and Kaizen process improvement in the gradual development of complexity in scope;
- *Step five*; Spread the effort to other university areas.

Even though the approach emphasises the implementation of the Lean in universities differs from traditional manufacturing Lean implementation, but the proposed model offers general steps and it is more focused on introducing a structural way to support Lean improvement rather than how to manage the improvement.

Diagnostic questions	Yes	Partially	No
1. Have all the stakeholders been represented at the outset of the improvement project?			✗
2. Has a formal process to capture & determine all stakeholders' requirement been used?			✗
3. Have the stakeholders' expectations been quantified, prioritised and balanced to streamline the value flow in a structured manner?			✗
4. Have the defined balanced requirements been used to guide optimisation of service effectiveness?			✗

Table 2.22 comparison table between Minnesota University model and the diagnostic questions

There is no indication of requirement for stakeholder involvement at the outset of the improvement project, rather than the involvement of frontline staff who feel the need for improving their process.

There is no indication of a formal process to capture and determine all stakeholders' requirement. Moreover, it does not suggest any method or step for quantifying and prioritising the expectations rather than training the process user i.e. selected stakeholder of service, on capability of Lean, and using Kaizen event for improvement.

The model revolves around the process user and Lean team for delivering Kaizen event improvement, while losing sight of all stakeholders' voice within the service for an effective improvement.

D. University of Scranton

The general proposed process of Lean implementation in HE office has been explained based on case studies within University of Scranton as;

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Figure2.10 Lean implementation in “Bringing Lean to the Office” (Tischler, 2006)

Prerequisites such as getting support from top managers, having trained person to facilitate the process and identifying a need for a change are needed. Following to that identifying specific value stream/process to be improved, while identifying the customers served by the value stream plus their various needs and wants (customer value), is required. Then comes to value stream mapping, which includes information such as times it takes for each action, and between each action (waiting time), as well as WIP. Then the wastes within the value stream get highlighted and brainstorm to map the ideal value stream. Once the future value stream is designed then implementation improvement plans can be created.

Diagnostic questions	Yes	Partially	No
1. Have all the stakeholders been represented at the outset of the improvement project?			✗
2. Has a formal process to capture & determine all stakeholders' requirement been used?			✗
3. Have the stakeholders' expectations been quantified, prioritised and balanced to streamline the value flow in a structured manner?			✗
4. Have the defined balanced requirements been used to guide optimisation of service effectiveness?			✗

Table 2.23 comparison table between Scranton University and the diagnostic questions

The model does not indicate anything regarding the stakeholder representation at the outset of the improvement project, rather than the need for getting top managers support for change, and identifying the customer served by the specified process which is required improvement.

There is no formal means for capturing stakeholder expectation within the model, rather than a general indication of requirement for identifying customer need and wants to specify customer value. Stakeholders' expectations are not quantified or prioritised, and the customer need and wants are only balanced towards waste elimination and efficiency.

The model loses sight of all stakeholders' voice within service improvement, while it uses brainstorming to map the ideal value stream.

E. University of Central Oklahoma

The model consists of 4 main steps (Moore, 2004) as described below:

Step 1: Identify the Opportunities - Complete an organization-wide diagnostic search for issues, problems and opportunities.

Step 2: Solution Design - Create a blueprint for success that involves all employees: training, mapping, and planning.

Step 3: Implementation – Use Kaizen events, core teams, and metrics to implement and illustrate the change.

Step 4: Continuous Improvement – Monitor performance after projects are completed.

Moore (2004) describes during the two days, a current state map and a future state map were created by the workshop participants. Approximately 50% of the time was spent in the classroom learning VSM techniques and the remainder of the time was spent actually walking the process, mapping it and discussing opportunities with the employees working the process on a daily basis. Departments independently implemented changes in their process based on the maps prepared in the workshop. Some examples of major changes made to improve processes include:

- Employment Services – online hiring system
- Purchasing – online requisition process
- Budget Office – electronic monthly reports (Moore, 2004)

Further Moore (2004) adds small group meetings were held with all employees in Facilities Management to explain the project and to solicit additional issues, opportunities and possible solutions.

The involvement of other stakeholders been highlighted in implementation phase by ‘As the changes were implemented, the team members explained them to employees within the process and observed how the changes worked. Minor adjustments were made on the spot using the combined knowledge of the employees and team members to get a workable solution that created positive change (Moore, 2004)’. Not involving stakeholders in structured way early on in the projects made them to go through adjustments on implemented solution. Even if, Step 2 of the model indicates ‘all employees’ involvements, but the implementation of the model approved only selected stakeholders (i.e. frontline staff) been involved in solution design, and it’s only on implementation phase that the other stakeholders been told what has been designed.

Moore (2004) explains further that, focus group has been in place to gather the area requires improvement and to develop and prioritize the problem statements. It is mentioned that the only stakeholders involved within the projects are the administrative staffs, to be trained on Lean principles. Whereas, by looking at the bigger picture, the administrative process is in place to provide a service to an external customer, i.e. the process is just part of a bigger picture within the HE-Service. Not involving the other stakeholders and developing the future state map without knowing the real value, the gap has not been studied properly. The mentioned solution is specified as removing the paper base documents, and moving to online systems, while the gap within the process for an effective service stays vague.





Diagnostic questions	Yes	Partially	No
1. Have all the stakeholders been represented at the outset of the improvement project?			
2. Has a formal process to capture & determine all stakeholders’ requirement been used?			
3. Have the stakeholders’ expectations been quantified, prioritised and balanced to streamline the value flow in a structured manner?			
4. Have the defined balanced requirements been used to guide optimisation of service effectiveness?			

Table 2.24 comparison table between University of Oklahoma model and the diagnostic questions

The cases provided as an example showed not all the stakeholders were involved at the outset of the project, and only the frontline staff e.g. administrative staff was involved. There is no formal process suggested in the model for capturing all stakeholders' requirements rather than defining requirements internally within the improvement project team based on past experience and focus group on reviewing area requires improvement.

While the stakeholders' requirements are not quantified and prioritised it is only after the development of solution and implementation that a 'combined knowledge' is investigated. This is shown to be by proposing the solution to other employees within the process, which lead to further changes for a 'workable solution'. The model lost sight of all stakeholder voice, when not able to manage them all and this led the improvement to require adjustment on implemented solution for having a workable improvement.

F. Coventry University

Coventry University approached the rise of demand on the growing competition for students, by using Lean principles, tools and techniques for continuous quality improvement (CQI). Coventry has embarked upon the implementation of an extensive Leadership development program (LDP) involving over one-hundred key staff from throughout the university (Martin, 2011). It is indicated the LDP involved a wide range of business related areas including:

- Performance management
- Employment law
- Finance fundamentals for HE leaders
- Leading with impact and influence
- Customer relationship management
- Managing difficult conversation
- Working with the press and media as well as host of additional awareness raising events

According to Martin & Arokiam (2008) "Participants of this program have become members of Leadership Action Teams (LAT's) who is undertaking improvement projects identified for their strategic importance to the corporate agenda".

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Figure 2.11 Process improvement strategy (Martin & Arokiam, 2008).

It is explained that the pilot improvement project was to review the current approval and recruitment process and change the process towards the reduction of time taken to recruit additional or replacement staff. With aim and expectation to raise staff, student satisfaction, and university profile.

To accomplish this work, Lean tools and in particular Value Stream Mapping (VSM) were used to identify the customer pathway and deliver improvements (Martin, 2011). The result was streamline process with less documentation, with 54% improvement in time, and 42% reduction in time taken to add value within this process.

This project was sponsored by the human resource (HR) director and included a rapid improvement event (RIE) conducted over two consecutive days (Martin, 2011). The improvement team for the workshop was made up of eleven participants drawn from an HR recruitment team, suppliers (external recruitment agencies), IT services, and customer drawn from library service, academic faculty and student services. The RIE trainers were trained on:

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Figure 2.12 Structure of the RIE (Martin, 2011).

The training was offered to them so that they can employ them as necessary and making them able to lead improvement. The stages within the workshop been explained by Martin & Arokiam (2008) as bellow:

- The workshop was started by introducing the general principle of non-value added activity with respect to the service environment. The participants also had the opportunity to practice a number of short exercises that made them conversant with the basic principles of Lean.
- The next stage was the development of the current state map for the recruitment process. The main development work was conducted by the participants with guidance from the trained internal facilitator where necessary. The development consisted of identifying the main tasks and the function with responsibility for completing it and finally attaching a time element for both value added and non-value added element of the activities.
- The lead-time calculated from the value stream map
- The value stream map when completed provided a good representation of the issues faced within the recruitment process. With the aid of the value stream map the participants were able to apply the seven-waste concept to identify the non-value added activities in the process. Such as; waiting for signatures, preparation of job advertisements, coordination of information, short listing process, organisation of interview,
- Using 5-why's improvement tool
- Putting together action plan and delivery of the achievements, by prioritizing based on the process efficiency and ease of implementation

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Figure 2.13 prioritising the implementation of identified tasks (Martin, 2011).

Even though the aimed was set for sustainable improvement and the team consisted of members from outside of HR, the opportunity for communicating and managing expectation been missed as the model does not offer a method to capture and manage multi-stakeholder expectations, and the challenges in implementation phase was raised more than expectation. In result as Martin &

Arokiam (2008) mentioned the 54% expected reduction in the time decreased to 20%. The reason being highlighted as; “Generally, where process changes to the value stream were proposed that were within the control and responsibility of a functional area, these were acted upon. However where changes proposed affected a number of functional areas i.e. changes to end-to-end processes, the lack of ownership, responsibility and authority becomes an issue (Martin, 2011).”





Diagnostic questions	Yes	Partially	No
1. Have all the stakeholders been represented at the outset of the improvement project?			
2. Has a formal process to capture & determine all stakeholders' requirement been used?			
3. Have the stakeholders' expectations been quantified, prioritised and balanced to streamline the value flow in a structured manner?			
4. Have the defined balanced requirements been used to guide optimisation of service effectiveness?			

Table 2.25 comparison table between Coventry University approach and the diagnostic questions

At the outset of the project all the stakeholders are represented, and made the improvement team. There has been no formal process to capture all stakeholders' expectation, while after training the improvement team on Lean theory and mapping skill the VSM is used to identify the customer path and highlighting the waste within the value-stream by adding time elements to tasks and functions.

Stakeholders' expectation is not quantified and only requirements were defined which balance efficiency toward reduction of time taken to recruit additional or replacement staff, by applying seven waste concept.

As the proposed approach does not capture expectations it loses sight of all stakeholders' voice to ensure all the existing process meet stakeholders needs i.e. it is focused only on efficiency rather than effectiveness of the service delivery.

G. The University of York

The overall aim of the information systems and services in the University of York is to create an information environment that supports, facilitates and enhances the teaching, research, business and community activities of a world-class University (The University of York, 2013).

A different range of process improvement projects has been happening within the University, by using Lean management concept, such as;

- Library loans system project; the library loan's system had become complicated and difficult to administer. It was requested to simplify the loans model as the current service was difficult to understand by users. Regarding the people who were involved in the project, the project team numbered 14 and ranged from library assistants to senior managers who all took an active role, the team were supported by the University Strategic Systems Programme Manager, who advised on the Lean methodology. (York University, 2014).

The library project improvement team held a 'blitz'- a two day intensive meeting- during which the team analysed circulation metrics, scoped current practices and undertook stakeholder exercises, as well as radically remodelling the loans model (York University, 2014).

At each stage of the projection consultation, feedback and review have been embedded into the model. Consultation methods included focus groups, open forums, "grab and goes", online surveys, and customer journey mapping. This variety of techniques provided the team with a range of contact from broad to highly specific and targeted, and allowed both general discussion and individual conversations to take place, the project also valued developing close relationships with student bodies (York University, 2014).

The project delivered a new loan model with key elements of:

- a) No fines are payable on any items unless they have been requested by someone else and are not returned on time;
 - b) Rolling loans for all items and for all borrowers throughout the year unless items are requested;
 - c) The length of loan adjusts automatically depending on the circumstances of the borrower (full time, part time, etc.) and depending on demand with requested items issued for less time;
 - d) Demand led the purchase of Library resources, including fast-track ordering of items in high demand;
 - e) Development of a transparent fines exceptions policy;
 - f) A pro-active approach to customer engagement actively encouraging borrowers to communicate with the Library (York University, 2014).
- Admission process for students with disabilities; the problem been brought to attention by one of the staff identifying that students with disabilities were arriving without everything in place to be able to start their courses, plus cases where a disability that affected the feasibility of a student undertaking a specific program had not been considered until after an offer had been made. So the project was based on looking at communication to encourage

and inform students about what they need to do before they arrive at university (York University, 2014).

The project included Legal Administrator, Disability Services Manager, Student Recruitment and Admissions, Accommodation, Equality and Diversity and Estates, also included admissions tutors from two academic departments that had specific issues with their courses: Archaeology and Social Work. It's been mentioned by project team that "it would have been useful to have included students with disabilities who had been through the process, but we did not do this. We made sure that we kept the Disability Equality Scheme Group (which includes student representation) aware of the project and gave them opportunity to contribute)".

The project began by mapping out the process for undergraduate and postgraduate students including international students. "Mapping out the process helped us to identify the key points of the process where we needed to consider options" (York University, 2014). The result of the implementation been improvement in communication mainly to the new students about what they need to do, and between Student Recruitment and Admissions, Disability Services, academic departments, and Accommodation Office and Estates where relevant.

- Timetabling; the aim of the project has been set for publishing an annual timetable to students and staff earlier, work on improving student satisfaction, and how systems integrated i.e. finding a way to produce it in a more suitable format.

"This required a complex review and progressive change process to many departmental and University timescales, and would ultimately need to lead to the reduction to the number of 'late changes' after publication of the full, annual timetable, whilst maintaining a central database of all student allocations to seminar groups (York University, 2014)"

Numerous departments been asked to explain the stage of producing the annual timetable, from an internal meeting on course delivery, data input, checking the timetable and signing off. From the provided the process Timetabling team and IT identified the stages and decided on the area require improvements. The timetabling team worked backwards to produce the timetable by the end of summer term in two years' time. The method been used where process mapping which allowed the project team to write a timeline to see what and when activities need to happen.

The challenge specified by York University is to decide what would have a bigger impact as an improvement.

The improvement included (York University, 2014):

- a) Student can see their combined, individual timetable in one place;
- b) Student can look at a particular module timetable and whether the module is available to switch to;
- c) Departments to send text messages or e-mail when there is a timetabling change the same day;
- d) Colour coding types of class;
- e) Automatically include travel time for student and staff between buildings (previously a manual task);
- f) Display personalised 'exam' timetables (York University, 2014).

At York University the 'value' concept been referred in strategic level as an effective working and the strategy achievement requirements listed as:

- Scholarship; work to add value to research, teaching and learning
- Honesty and transparency; act with integrity and communicate openly
- Customer focus; provide excellent service and exceed expectations
- Respect; value and respect each other and work with shared purpose
- Inspiration; have a forward thinking culture, encouraging contribution from all (The University of York, 2013).

While the specified value provides the right direction as a vision for the University but when it gets to any operational project with multi-stakeholders and complex processes it is too general to guide the project to specific direction.

In cases like York University-Admission process, for students with disabilities, stakeholders made the project team and expectation has been gathered, it is stated that "finalising the route to take – because it is not possible to find the perfect process and you need to balance requirements (York University, 2014)". Balancing the requirements has been highlighted as a hardest thing about the project.





Diagnostic questions	Yes	Partially	No
1. Have all the stakeholders been represented at the outset of the improvement project?			
2. Has a formal process to capture & determine all stakeholders' requirement been used?			
3. Have the stakeholders' expectations been quantified, prioritised and balanced to streamline the value flow in a structured manner?			
4. Have the defined balanced requirements been used to guide optimisation of service effectiveness?			

Table 2.26 comparison table between University of York and the diagnostic questions

Reviewing the proposed improvement cases shows all the stakeholders are represented and their requirements are captured through a formal process such as focus group, open forum, and online survey. However, as there is no specific model with defined stages there are variations in improvement process between the cases.

The need for balancing the requirement is realised but there is no method or step introduced to overcome the challenge. And in hence, an unstructured selection of requirements has been used towards development of the solution. The solution is guided by critical interaction of stakeholders within value stream, which partially guides optimisation of service effectiveness.

2.8.1.1 Cases developed for HE, within different environment

The first case introduces a model for HE by doing a review of delivery course in engineering college at Tennessee University. In the second case 'House of Lean for Public Service' has been introduced while the review of universities has been taken forward.

- **University of Tennessee**

The model developed by Dr Alp at the University of Tennessee called "Lean Transformation Model" is a model which designed to show how Lean principles can be used to transform HE systems to a Lean organization. The study is the implementation of Lean thinking concepts, tools, and processes in the College of Engineering at University of Tennessee at Chattanooga (Alp, 2001).

The model aims for delivery of below objectives:

- To identify the ultimate customer
- To use the mapping value stream to remove waste from the system
- To create flows for the value
- To pull each elements when needed
- To pursue perfection

Between teaching, research and service functions, the teaching is the most important function by the concern and the policy of the university. As the enrolled students been known as consumers of knowledge, therefore the value is concentrated to be delivered to students. The ultimate value has been defined as:

- Value to career, and;
- Value to personal interest (Alp, 2001)

On the receiving end, the value that student can gain depends on what student learn, and how student learn. These two factors described by Alp (2001), as a dependent on courses structured under the programs is provided, and the details of knowledge under each course, as well as

university being responsible for structuring the programs to provide the student with a broad background in engineering sciences and in-depth focus in the most effective ways.

The only process that adds value to the students been defined as a process of transferring knowledge, while the two important processes to deliver value to students been mentioned as;

- Method of transferring knowledge to students; should include the objectives of each course and what they will learn; e.g. Course objectives, Course Nature, Course Delivery, Modules
- The process of assessing students for knowledge they receive; e.g. assignment, test, and grading should be able to evaluate the students' performance to determine if they learned the material. (Alp, 2001)

The developed model is a flowchart which aimed to be used by academic staff to monitor students and give respond to the action quickly (Refer to Appendix 4).

By reviewing the model, it has been mentioned that the ultimate value being "defined" for "customer, i.e. student", but it has not been mentioned or showed any method, or way or process that the model suggest for going through defining the value, rather than the expert assumption.

The model lacks the ability to offer the opportunity for improvement based on analytical review of customer expectation. The example can be made in the case where the most efficient process is in place for transferring knowledge, but not considering market and companies' expectation from graduates. Hines (2008), views about the model is, "Some authors (for example Alp, 2001) have explicitly discussed the implementation of Lean in universities, but these works have largely been delivered from a theoretical, generalist perspective.

Diagnostic questions	Yes	Partially	No
1. Have all the stakeholders been represented at the outset of the improvement project?			✗
2. Has a formal process to capture & determine all stakeholders' requirement been used?			✗
3. Have the stakeholders' expectations been quantified, prioritised and balanced to streamline the value flow in a structured manner?			✗
4. Have the defined balanced requirements been used to guide optimisation of service effectiveness?			✗

Table 2.27 comparison table between University of Tennessee and the diagnostic questions

There is no step in the model highlighting the need for representing all the stakeholder at the outset of the project. There is no formal process to capture stakeholder requirements and instead students

benefits are defined internally based on past experience and ABET (Accreditation Board for Engineering and Technology).

The expectation are not quantified or prioritised within the model, and as a substitute the improvement is based on fixed selected values set for consumers i.e. students. In hence the model loses sight of all stakeholders' expectation within the service improvement project, while it suggests a standard process to be used as a blue-print of the service.

As the review of the cases is shown in table 2.27, except Coventry University and University of York none of the universities did not represent all the stakeholders in outset of their improvement project. The involvement was within range of selected stakeholders, or only customer or involvement of downstream staff in implementation phase later on in implementation phase to present the solution.

	1	2	3	4
1. Cardiff University	No	partially	partially	No
2. University of St Andrews	No	No	No	No
3. University of Minnesota	No	No	No	No
4. University of Scranton	No	No	No	No
5. University of Central Oklahoma	No	No	No	No
6. Coventry University	Yes	No	No	No
7. University of York	Yes	Yes	No	partially
8. University of Tennessee	No	No	No	No

Table 2.28 Summary of models evaluation against diagnostic questions

There is no formal process to capture and determine all stakeholders' expectation proposed in any of the universities cases except University of York, where they used focus group, online survey, customer journey to gather and elicit requirements. The rest had used either defining requirements internally and based on past experience or skipped the step to map the current state.

Regarding balancing the expectations, none of the improvement was based on quantified and prioritised expectations. Even in cases like University of York, where the student as end customer been consulted, there has not been a method to quantify and prioritise the expectations of stakeholders in a controlled way. Not having a formal process in place to do so, the improvement were either solely based on customer or requirements that deliver balanced efficiency , or it is looked for combined knowledge after implementation as follow up events to review the issues

raised by not delivering the expectations. The approach of changing the solution post-implementation, with expectation to raise staff and students satisfaction was common.

In result of not having all the stakeholders represented correctly in outset of project, a formal process to capture their expectation, and quantify and prioritise them, the project was led to losing sight of all stakeholders' voice through designing the solution for an effective service.

The commonality between the cases reviewed can be categorised as:

- They are all project base improvement; Kaizen event or C.I. projects seems to be a common approach across the universities for implementing Lean which are organised based on site-specific events.
- The intension is the back office improvement, does not need to include any stakeholder rather than the ones working directly on the process, whereas in cases like 'Admissions processes for students with disabilities' at University of York, the process improvement improved the student experience, although it is very much a back office process. Plus, it is approved having stakeholders on board had an effect on a better understanding of the issues from departmental perspective, as it is quoted from the project *"I think that all the team involved-and the academic departments-gained something from hearing each other's perspectives (York University, 2014)"*. Base on the survey done by Seddon (2008) in public service, '30 percent of staff worked in what were described as back-office' functions, where they were described as having become dissociated from customers. The purpose was set as specific standard work to be done within set targets to meet, while they were losing focus on the fact that they were serving customers.
- Looking for 7 Lean manufacturing wastes within the process; this would only give information on those specific areas, whereas if the system condition which caused the service waste is not eliminated, any improvement would not be effective and sustainable.
- Value stream mapping (VSM) being used as the starting point of the improvements, which can be highlighted as the similarity between the approach in manufacturing and current Lean implementation in HE Service. As Seddon (2008) suggested so many managers want to go straight to the business of mapping the process, thereby missing two vital sources of information: "demand that tells you what to map and the performance measures against purpose that tell you where the priorities lie". Losing sight of stakeholders' voice in improvement, and only change the process towards waste elimination and expect the staff and student satisfaction raise in result, can lead to a sub-optimal outcome for the project.

Lean has been identified as an improvement methodology in HE but the philosophy has not been embraced fully, what has been embraced fully is the Lean projects can be used to deliver benefits to HE, and different Universities developed their own way to gain benefit. They all focused on individual processes rather than the big picture, i.e. service or organisational level. None of the mentioned cases illustrate a clear, step by step execution of all stakeholders' involvement for value specification. Like the new approach of Lean in manufacturing for dropping the buffer and instead get well connected to customers, having a strategy in place for improvement projects to be connected to all stakeholders is more important than the internal efficiency.

Using Lean for improvement projects, while the benefits of involving stakeholder has been approved in management concepts (refer to section 2.7.1), the review highlighted the lack of appreciation of stakeholder involvements and expectation management, to continue to focus on balanced stakeholder requirement in life of the project.

Specific projects have been already identified in this research by interpretation of Lean, which is the KAIZAN approach i.e. project improvement. Lean has shown value in University sector, however, of the value highlighted the stakeholder expectation is not realized. And that where complexity included multiple and competing objectives, these need to be identified and prioritised. And that to provide consistent results and sustained improvement this should be an integral part of the improvement model utilised.

2.9 Models and Frameworks managing multi-stakeholders

Following to the review of the seven publicly recognised cases in HE, implementing Lean as an improvement methodology, the gap has been reinforced on capturing all stakeholders' requirements to enable the effective delivery of the service, a brief but broad review of other cases in carried forward. This wider aspect of research on the other public organisation that share the similarity of having functional boundaries within their service and multi-stakeholder (i.e. complex environment) introduced the other models where they specifically seek stakeholders view by taking different approaches. The cases can be classified as best practice in realising the importance of capturing stakeholder requirements.

The cases 1,2,3,5,6 are neither Lean nor about improvement project in HE, case 3 is not Lean but in HE, and case 4 is Lean but not in HE, it is however worthy to note, that each did inform the likely approach to complex multi-stakeholder management.

1	Australian Red Cross Blood Service
2	Tourism Stakeholder Management
3	Hoshin Kanari and Balanced Scorecard in HE
4	Aerospace Product Development
5	CAFCR (System Architecting)
6	Project management approaches

Table 2.29 List of reviewed models in Public organisation

2.9.1 Australian Red Cross Blood Service (ARCBS)

The case is neither Lean nor about improvement project in HE, but interestingly did inform the likely approach to complex stakeholder management.

In a paper written by Professor Roos et al.(2003), which is based on a case-study on the Australian Red Cross Blood Service (ARCBS) steps for mapping stakeholder perceptions for a third sector organisation been put together. The concept is around managing knowledge and innovation, which being referred to as “intellectual capital concept” in the public service sector. Information, intelligence, knowledge, and finally, wisdom are related, but take on different values with increasing scope and context (Grantham et al., 1997). Roos (2003) argues stakeholder management enables managers to ensure that the strategic and operational direction of an organisation addresses stakeholder perceptions. Roos emphasis is more on the strategic management side of organisation, by investigating the perception of stakeholder groups on highly valued key performance areas (KPA's). Stakeholders are recognised as being of particular importance in public and non-profit organisations, which commonly have a more diverse group of stakeholders than private for profit organisations making it more difficult to identify strategic issues (Bryson, 1995).

The illustrated research process consisted of 9 steps (Roos, 2003):

1. Desk audit of the literature
2. Workshops with ARCBS management to determine context and discuss KPAs
3. Stakeholder groups and members determined; 22 stakeholders in 11 stakeholder groups rather than 12 (because stakeholders from the media chose to participate in either the interview process or the questionnaire), each group had a different perspective and consequently no two groups could be combined
4. Draft Holistic Value Added (HVA hierarchy) determined; the value hierarchy consisted of nine KPAs; Safe product, Product sufficiency, R&D and other services, External management,

Internal management, People management, Working with stakeholders, Donor and volunteer management, Public confidence

5. Interviews with stakeholders to refine hierarchy (face-to-face and telephone)
6. Revision of the hierarchy after feedback from stakeholders; the final hierarchy consisting of nine KPAs, 22 intermediate and 65 attributes
7. Final hierarchy (version 9); the process involved working through eight versions before the final version
8. Survey to all stakeholders (by email); The written survey requested 90 stakeholder participants to rank the nine KPAs in order of importance, in turn, they ranked the attributes within each KPAs and designated each a numerical weighting and made decisions about indispensability and attribute character. Overall a response rate of almost 50% was achieved. Some respondents considered they had already contributed at the interview stage and did not contribute in the survey.
9. Analysis of data and results

HVA is explained by Roos (2003) as a third generation intellectual capital index tool the outcome of which is a totality measure that reflects the value perceived by any given observer. Even though the proposed stages provide a basis upon which helps ARCBS to understand its numerous and diverse group of stakeholder, but as it's been mentioned a number of iterations they had to go through (9 versions being made by repetitively interviewing 22 stakeholders) seem to be extremely time consuming. However, it can be argued that the time being spent in front can save money and time later on, but the proposed stage seems not to be successful in keeping the stakeholders engaged, for instance having 50% involvement of stakeholder in the survey as they stated it to be repetitive. The stages have not been proposed as a model, but as an approach only which is being applied in one case (ARCBS). The stages designed purely for strategic purpose by looking at important KPI's to the stakeholders, and there is not any indication on "how's" i.e. the linkage of the strategic expectations, to the process and operational level.

2.9.2 Tourism Stakeholder Management

Waligo et al (2013) highlights to date a number of studies have called on stakeholder involvement in the sustainable development of tourism, however the multiplicity and heterogeneity of tourism stakeholders render the process complicated. Despite of previous proposed method for stakeholder involvement, this framework proposed to aim for finding a way to effectively involve multi-stakeholder involvement management (MSIM). The case study of the Cornwall Sustainable Tourism

(CoaST) project in the United Kingdom been used to identify and elaborate the components of the MSIM framework (Waligo et al., 2013).

The MSIM approach indicated to underpin by three basic assumptions (Waligo et al., 2013):

- Stakeholders are acknowledged as a core component of the implementation of Sustainable Tourism (ST), (stakeholder identification)
- Stakeholder perceptions are sought to facilitate the development of effective stakeholder involvement strategies (stakeholder engagement) and
- Stakeholder involvement can facilitate the achievement of ST objectives (multi-stakeholder involvement)

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Figure 2.14 MSIM Framework (Waligo et al. , 2013)

The framework is based on three strategic levels of Attraction, Integration and Management. There are six stages embedded within these three strategic levels of MSIM framework (Waligo et al., 2013):

- Scene-setting; enhances awareness, understanding of the concept through communications that different stakeholder groups can comprehend
- Recognition of stakeholder involvement capacity; Identifying stakeholders and analysing them, can aid the understanding of stakeholders' different situations so that stakeholder engagement is targeted
- Stakeholder relationship management; It deals with varied stakeholder perceptions and secures support for the implementation of ST through multi-stakeholder interactive networking. Talks, presentations and informal discussions with tourism association, town councils and business, local authorities, colleges and community groups are the method used in this stage.
- The pursuit of achievable objectives; it supports the integration, strategic level in terms of stakeholder adoption to the wider goal of ST.
- Influencing implementation capacity; to deliver a comprehensive business plan
- Monitoring stakeholder involvement; it supports the management strategic level through the review of implementation and the reward of effort and achievement.

The framework clearly focuses on facilitating the stakeholder involvement by increasing their awareness and perception of the value (i.e. ST) to the Tourism organisation. Having a planned communication route in place is one of the other positive points of this framework in a multi-stakeholder environment. Even though, the framework emphasis on people are at the centre of sustainable development, but not specific method been proposed for analysing the expectations from stakeholders. Moreover, the framework has been presented based on only one case hence, additional case studies would be required to validate robustness and generalizability of the MSIM.

2.9.3 Hoshin Kanri and Balanced Scorecard in HE

Hoshin Kanri became accepted generally as an integrated approach for companywide management during the 1960s (Witcher, 2001). Strategic management involves integrating an organisation's vision, goal, policies and tactics into a unified whole (Asan & Tanyas, 2007). Hoshin Kanri and Balanced scorecard are two strategic tools which can be used to structure and implement strategies. Scorecard initially developed by Kaplan and Norton (1992), as a model to translate the vision and strategy of the business into objectives, measures, and targets in four perspectives: financial, customer, internal business processes, and learning and growth. The scorecard construction should facilitate balancing the organization's strategy formulations into these four perspectives. (Asan & Tanyas, 2007). Basically, the Balanced Scorecard is about creating a strategic framework, where all

corporate actions fit together in a cause and effect chain, setting goals and measuring performance, and communicating with everyone to provide them with a clear understanding of the effects of their own actions on the organization's vision (Kaplan & Norton, 2001).

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Figure2.15 The Balanced Scorecard (Kaplan & Norton, 1996)

Each of the tools on their own can be applied for implementing strategies, however Asan & Tanyas (2007) compared them based on;

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Table2.30 Comparison of Balanced Scorecard and Hoshin Kanri (Asan and Tanyas, 2007)

The strength of Hoshin Kanri is in communication or as Asan (2007) explains "Hoshin Kanri is especially valuable in its inherent ability to align employees from all levels of the organization to a common goal and to ensure that they are aware of where they stand in relation to top management strategy".

The model which combines Scorecard and Hoshin Kanri is presented in figure 2.17 with steps of:

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Figure2.16 The integrated methodology for strategic management (Asan & Tanyas, 2007)

The introduced model been used in Istanbul Technical University in engineering management program (EngMan). As the model shows, the process starts with preparation activities, the customer target of EngMang are engineers, and the competitive environment, where EngMan resides, consists of educational institutions that serve engineering management or similar programs such as technology management, industrial management and business administration (Asan & Tanyas, 2007). The major processes have been highlighted as promotional activities, educational activities, administrative activities, academic activities, and financial activities. A group discussion on the identification of EngMan's strategies and their relations is held by the program's academic staff, to identify strategies, the critical processes, vision and mission statements, the strengths and weaknesses of EngMan as well as opportunities and treats are considered (Asan and Tanyas, 2007).

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Figure2.17 Scorecard perspectives of EngMan with critical success factors (Asan & Tanyas, 2007)

The strategy map starts with ultimate goal i.e. 'create a brand', then it is a customer perspective which contains strategic objectives in marketing, then it is required to question what is required to derive these objectives. The development perspective includes strategic technologies, strategic competencies, and a financial support. These are drivers for the strategies in the activity perspectives (Asan and Tanyas, 2007).

Figure2.18 The strategy map of EngMan (Asan and Tanyas, 2007)

Following the strategy map, Hoshin plan is developed for each objective, as the means to achieve it, related measures with the targeted improvement direction and determination of activity owners. Implementation plan was developed at the end. The model has been reviewed as it is aimed to facilitate and introduce a method for meeting demands and keep up with the changes in educational institutions. Even if the model has introduced a way of managing a wide view to business goals and then working towards details and objectives in a specific stages, but the involvement of stakeholders has not been paid attention to and the knowledge of programs' academic staff involved in the project had been taken as the general expectation. The other point to specify is the model is developed only for strategic management/improvement projects. But the interesting point out of the model is development of value drivers through the improvement project.

2.9.4 Government aerospace, Product Development Value Stream Mapping (PDVSM) by LAI (Lean Aerospace Initiative)

The case was selected as the Lean implementation in product development has similarity with Lean in service as McManus (2005), explained in table 2.31:

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Table 2.31 Applying the five Lean steps to Engineering (McManus, 2005)

Both service and product development value is hard to define and their value stream exists of information and knowledge. The key identified steps by LAI are as follows (McManus, 2005):

- Identifying Key Stakeholders; the key stakeholders and their expectation for the process, its outputs, and the improvement of both, need to be identified. The expectation can be both from the enterprise, i.e. internal customer, for instance cost saving, and the external customer e.g. price reduction, higher quality. Depending on the situation, other stakeholders may have critical needs to be met or contributions to make.
- Defining the Team; the team can consist of multi-skill or multiple people
 - Lean Experts and facilitators, System/Enterprise thinker, Process owner(s), process participants, Customer(s) and supplier(s), and other key stakeholders. It is mentioned in the report that external consultants can be called on to fulfil one or more of the team roles.
- Training the Team; the team must be at least trained in Lean and the methods and tools chosen for value stream mapping and analysis
- Bounding the problem:
 - The 'process bounds' including the beginning and ending point of the process
 - The 'owner' to provide a point for direct responsibility for the stream
 - The 'output' provides reason for the stream to exist
 - The 'customers' receive the product from the owner at the end of the value stream
 - 'initial input' knowledge and information, raw material
 - 'Constraint' place limits of many sorts on the process (McManus, 2005).

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Figure 2.19 Bounding the problem to which PDVSM will be applied (McManus, 2005)

- Defining the Value by process value question; assuming the process is value added, it is required to deliver the process efficiently, to do so it is required to understand value in two levels:
 - The value of the process output to the larger enterprise and
 - Creation of that value during the carrying out of the individual tasks that makes up the process (McManus, 2005).

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Figure 2.20 Process value questions (McManus, 2005)

- Understanding Value creation; understand how tasks within the process contribute to the goal. Rather than rating tasks as value-added and non-value-added McManus (2005), listed the aspects of the value that a task can contribute:
 - V1. Definition of end product with desired functional performance
 - V2. Definition of processes to deliver product
 - V3. Reduction of risks and uncertainties
 - V4. Forming final output
 - V5. Facilitating communication
 - V6. Enabling other tasks
 - V7. Meeting or reducing cost and/or schedule
 - V8. Learning or resource improvement
 - V9. Enhancing employee job satisfaction
 - V10. Other

- Mapping the current state value stream through three basic steps:
 - Arranging the process steps and information flows; making current state map
 - Collecting performance data on the tasks; waiting time, cycle time
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Figure 2.21 value stream with data (McManus, 2005)

- Evaluate how value is created; do they add to the product definition? The process definition? Do they reduce uncertainty ways that make the definitions more valuable?

After going through specified steps the information waste bases 7waste in Lean gets categorised followed by improvement plan. The interesting point about the model put stakeholder identification and their expectations as an initial step prior to defining project team and training. While breaking down the process, by reviewing the raised issues and expectations, rather than having value-added or non-value added activates, a listed aspect of value that the task can contributes is made.

2.9.5 CAFCR: A multi-view method for embedded system Architecting

Muller's (2004) approach which is focused on requirements of the company by going through what is needed for the operation while it is focused on customer world, goes through the following steps tied to acronym CAFCR:

- **Customer objectives:** defining the customer what
- **Application:** defining the customer how
- **Functional:** defining the product what
- **Conceptual:** defining the product how
- **Realization:** defining the product how

The importance of his model is the fact that the first step is to understand customer objectives, which gives direction for customer requirement gathering and the system improvement. Muller emphasises that a short list of key objectives from a customer can provide a clearer understanding of the customer and expectation rather than a long list of requirements. This approach is consistent with ISO 42010/IEEE 1417 and has been shown to be successful in several new developments (Bonnema, 2011). The example of architecture framework and models that confirm the concept in software and system management can be classified as Zachman's information systems architecture framework, and The Open Group's Architecture Framework (TOGAF).

2.9.6 Stakeholder Engagement and Project Management approaches

Prince2 (Projects IN Controlled Environments), MSP (Managing successful Programmes), and PMBOK (Project Management Body of Knowledge) are the recognised approaches on effective project and programme management.

PRINCE2, used extensively by the UK Government and also widely recognised and used in private sector, both in the UK and internationally. The key feature of the PRINCE2 is on dividing the project into manageable and controllable stages. Even though PRINCE2 does not provide any specific techniques for stakeholder analysis (Hinde, 2012), it is emphasised that project management team must include people from a broad range of stakeholder perspective especially those viewing the project from business, user, and supplier perspectives (Hinde, 2012). The stakeholder analysis and engagement is required to be done by project manager in starting up a project process.

MSP, is a best-practice framework for delivering complex programmes in accordance with long term strategies (APMG, 2015). It emphasises on Stakeholder Engagement and Benefit Realization Management. The MSP framework ensures that the stakeholders are identified and engaged in an appropriate manner to allow the participation and involvement of those who have an interest in the outcomes (Dolan, 2010). They include those managing and working within the programme and those who are directly or indirectly contributing to, or affected by, the programme or its outcome such as:

- Users/beneficiaries e.g. customers, staff
- Influencers e.g. trade unions, press
- Governance e.g. management boards, steering groups, audits
- Providers e.g. suppliers, business partners (OGC, 2003).

OGC (2003) explains understanding stakeholders' interests in the programme, and the impact that the programme will have on them, and then implementing a strategy to address their issues and needs, is an essential part of successful Programme Management. This is described through stakeholder management strategy OGC (2003):

- Analysing stakeholders; with objectives of achieving a thorough understanding of their requirements and their interest in, and impact on, the programme so that communications address their particular interests, issues and needs.
- Clear stakeholder communication; with objectives of keeping awareness and commitment high, maintain consistent messages within and outside of the programme, and ensure that expectations do not drift out of line with what will be delivered.

- The communication plan; describes 'what' will be communicated, 'how' it will be communicated, by 'when' and by 'whom' during the programme. This is with objectives of raising awareness amongst all stakeholders, gaining commitment to the change being introduced, keeping all stakeholders informed, demonstrating the commitment to meeting the requirements of those sponsoring the programme, and making communication two-way by encouraging stakeholders to provide feedback and ensuring they are informed about the use of their feedback.
- Communication channels; is an ongoing two-way interface between the programme and its stakeholders.

MSP recognizes the criticality of communication with the stakeholders and the link between this engagement and the leadership (Dolan, 2010).

PMBOK is a collection of processes and knowledge areas accepted as best practice for the project management profession. Stakeholder identification is mentioned as a typical component of the initiating process, while determining stakeholders' needs, requirements, and identifying the priorities of the key stakeholders and their expectations will be necessary (Saladis and Kerzner, 2009). Stackpole (2013), describes many stakeholders on a project will be obvious, such as the customer, end user, sponsor, team members and vendors, however, there are certain stakeholders who may not be readily apparent. To prevent the confusion the method that Stackpole (2013) recommends based on PMBOK, is stakeholder analysis (power and interest grid), expert judgement, and meetings which should feed into the stakeholder register document. Stakeholder register lists the stakeholders' name and relevant information when conducting a stakeholder analysis such as contact, department, and information from stakeholder analysis matrix. This list will be used for collecting requirements. The recommended techniques for collecting requirements from stakeholders (Stackpole, 2013) are interviews, focus group, workshops (using QFD), brainstorming, affinity diagram, mind mapping and multi-criteria decision analysis. The Affinity diagram and nominal group technique is described as a method to prioritise and lay out the information generated from brainstorming in natural groupings. Multi-criteria decision analysis is used to weight several criteria to provide a quantitative method for prioritising or including requirements. Based on PMBOK guide, the requirement documentation will define the project scope.

The reviewed best practice project and programme management frameworks all have the recognition, within the framework, that engaging and communicating with stakeholders is essential to the success of the programme and project.

2.9.7 Findings to be used on addressing specified diagnostic questions

The review of the cases in section 2.9, brought together a list of approaches that can be used to address specified root definition of relevant concern (i.e. the gap in knowledge), in managing all stakeholders' expectations.

Root definition of relevant concern	Is it done? How is it done?	Comments and recommendation
Represent all stakeholders	<ul style="list-style-type: none"> ○ Grouping stakeholders ○ Acknowledge stakeholders as a core component of service implementation ○ Expectation from both internal and external customer 	Instead of disqualifying any stakeholder, present all stakeholders and classify/group them
Capture all stakeholders' requirements	<ul style="list-style-type: none"> ○ A structured/planned method of communication to capture requirements ○ A list of key objectives from stakeholders 	A formal process to capture and determine all stakeholders requirements
Quantifying, prioritising and balancing stakeholder requirements	<ul style="list-style-type: none"> ○ Rather than rating task as V.A, N.V.A (i.e. solely waste realisation), list the aspect of Value that the task can contribute 	Select key requirements in critical manner
Guide optimisation of service effectiveness	<ul style="list-style-type: none"> ○ Deliver only the V.A. processes, effectively ○ Development of Value-drivers ○ Evaluate how value is added 	Use the defined requirements as a guide/value-driver of service effectiveness

Table 2.32 Findings to be used in model development

The presented models recognised the need for capturing stakeholder requirements, however not a single methodology was provided to cover the gap fully.

2.10 Summary

In common with other service environments, Lean thinking has very rarely been applied to universities and, in comparison with manufacturing environments; - Universities are in the early stages of improvement activities (Hines, 2007). However, there is much evidence to show that the application of Lean in public sector service environments can be extremely beneficial leading to improved processing times, improved service performance and ‘achieving more with less’ (Radnor et al., 2006). Much has been written about U.S. Institutions’ endeavours in this regard, such as Moore (2004), Salewski (2009), Tischler (2006), Emiliani(2014) but in confirming the findings of Hines (2007) as suggested these examples concentrate on improving quality, cost and delivery through a variety of Plan, Do, Check, Act cycles within the value stream and have yet to evolve into full strategic and operational value systems. However, the work undertaken demonstrates success of the applicability of Lean within, for example, the health sector, which in turn suggests that due to a number of parallels with the educational sector, Lean can become a suitable candidate towards application in the HE environment (Martin, 2012). Moreover, Radnor and Bucci (2011) in their study of Lean in Business Schools and Universities concluded, “There is little doubt that Lean programmes undertaken in the case study organisations i.e. HE have had significant impacts”. However, to avoid the concern raised BY solely focusing on tools without understanding the principles, which would lead to ‘failure of Lean improvement in public sector’ (Radnor & Osborne, 2013), the underlying logic & theories of service management in relation to Lean principles require to be understood. The critical steps in a Lean philosophy for system management as shown in figure 2.22 are described as:



Figure 2.22 Lean Principles

Within Service, the review of literature confirmed that the Lean philosophy holds true but that the methodology does not work in areas like 'value identification' on intangible product the same as that for a tangible product, 'Pull value' while the provision is simultaneous with consumption in service is not practical, and methods like Takt time or application of a Kanban system in service does not fit the environment as the system need to be able to absorb variety not the flow.

Despite the recognised importance of the stakeholder in the creation of value (Womack et al., 1996b; Morgan, 2006; Hall, 1993; Zeithaml, 1988; Zeithaml, 2006, Radnor, 2010b; Drucker, 1998), research has largely presented business-to-customer delivery case examples with little focus on the contribution made by the customer in the realisation of an experience (Angelis, 2012) i.e. value identification. Radnor (2011) after studying the implementation of Lean in five universities raised the point that there are assumptions made regarding customers' requirements and that the 'Voice of Customer' has not been clearly articulated by direct involvement in Lean improvements.

While customers of HE services are stakeholders of the service as well as their transformation is HE product, in addition to they have long engagement with the University (Radnor and Bucci, 2011), Radnor (2010) emphasises based on Lean thinking expectation, that to deliver value across the organisation, it is critical to involve people who are an inherent part of the system delivering the service, i.e. 'All stakeholders'. In the review of business improvement methodologies in public service by Radnor (2010), one of the barriers identified to process improvement i.e. the opposite of the success factors identified was lack of consultation with stakeholders, lack of prescribed methodology to do so, and thus their poor engagement with and communication throughout the project.

The literature review highlighted the 'root definition' of relevant concern which requires further exploration in area of:

- Representing all stakeholders
- Capture and determine all the stakeholders' requirements
- Quantify, prioritise and balance stakeholders' expectations
- Guide the optimisation of service effectiveness

The review of the approach and proposed models for Lean implementation, against the diagnostic questions, driven from root definition of relevant concern, in HE e.g. within Cardiff University, University of St Andrews, University of Minnesota, University of Scranton, University of Central Oklahoma, Coventry University, and University of Tennessee, highlighted there is no single model or framework which:

1. Identifies explicitly all the stakeholders at the outset of the improvement project
2. Includes a formal process to capture and determine all stakeholders' requirements
3. Includes a formal process to quantify, prioritise and balance their requirements to streamline the value in a structured manner
4. Balances these defined requirements to guide optimisation of service effectiveness to ensure meeting existing and emerging/anticipated need

This preliminary study resulted in the research problem: "That in order for an improvement project to be perceived as successful from a stakeholder perspective, their requirements would need to be understood at the outset of the improvement project and that where complexity includes multiple stakeholders, with a number of objectives, these would need to be identified and prioritised. In order to provide consistent results and sustained improvement, this action should be an explicit part of the improvement methodology utilised".

Hence, the need to explore the concept of all stakeholders' value identification as key performance measure on improvement for HE public service delivery and that when complexity includes cross-functional process and multi-stakeholders this has been reinforced. Therefore, the research aim is: "To provide a means of identifying and prioritising stakeholder requirements at the outset of an improvement project, such that, in meeting the business needs the resulting outcome provides a 'better fit' solution for all stakeholders".

The following research objectives were designed to support the delivery of the aim:

1. To establish a methodology in order to represent all stakeholders to an improvement project;
2. To develop a methodology to determine the importance of the stakeholder requirements and their relative importance;
3. To develop a means of specifying the value desired by each stakeholder;
4. To design and test a methodology that is able to inform an improvement project such that the project outcomes are aligned to stakeholder requirements;
5. To determine the utility of this methodology in improving stakeholder satisfaction with project outcomes.

Methodology & Research design

3.1 Introduction

The previous chapter informed the research problem, as the requirements of all stakeholders require to be understood at the outset of the improvement project, to provide consistent results and sustained improvement. This chapter will confirm the research methodology plan to be used throughout the research, and will describe what was done, how it was done, and very importantly why it was done, to demonstrate the rigour of the research process. Due to this, a structured approach to the research was adopted and demonstrated.

There is a general belief that research should start with a clear and accurate hypothesis that guides the research throughout, however in the case of this research, as a qualitative research, a less focused approach was taken at the start that developed over the course of the research into more defined 'Research Problem'. Although the research evolved around the question of 'how Lean is implemented in HE' at the inception, this was refined into a root definition of relevant concern, got developed to research problem which lead to diagnostic questions. Hence the research process was not fully planned before the start although a work plan was initially laid out. It is thus important that in order to defend the research, the methodology used is shown to be appropriate. This chapter therefore lays out the research paradigm through ontology, epistemology and methodology to create a holistic view of how the researcher viewed the knowledge in the area of discourse.

3.2 Choice of Research Methodology

Research generally begins with a question or problem and requires a decision making process (Brannick and Roche, 1997), with the initial decisions arising from a set of beliefs that a researcher holds. Myers (1998) states that all research i.e. qualitative or quantitative, is based on some underlying assumption and decisions about what constitutes valid research and which research methods are appropriate. Saunders et al (2012), suggests a generic approach as 'research onion' with layers that are depicted as:

- Research Philosophy
- Research approach (Methodical choice)
- Research Strategies

- Time horizon
- Data collection methods (Techniques and Procedures)

3.2.1 Research Philosophy

According to Guba and Lincoln (1994), paradigms are viewed as a set of basic beliefs (or metaphysics) that deals with ultimate or first principles. This represents a worldview that defines, for its holder, the nature of the “world”, the individual’s place in it, and the range of possible relationships to that world and its parts. This can be characterised through: ontology (What is reality?), epistemology (How do you know something?) and methodology (How do you go about finding out?).

Two major research philosophies have been identified in the Western tradition of science, namely **positivist** (which means Scientific) and **interpretivist** (also known as antipositivist) (Galliers, 1987). Positivist methodologies argue it’s possible and desirable to study social behaviour in ways similar to those used by natural scientists (Livesey, 2006). The criteria for categorizing positivist articles are the indications of hypotheses, propositions, model formation, quantifiable measures of variables and the inferences drawn from samples to populations (Orlikowski, 1991), all of which demonstrate the understanding that ‘objective’ data could be collected to predict the relationship among factors and to test hypotheses or theories (Walsham, 1995). The interpretivist paradigm or hermeneutic approach highlights that the subject matter investigated by the natural sciences is different to the social sciences, where human beings, as opposed to inanimate objects, can interpret the environment and themselves (Onwuegbuzie, 2000). The criteria for selecting interpretive articles are threefold. Foremost, articles should not involve any positivist indicators:

1. No deterministic perspectives imposed by the researchers.
2. Participants’ perspectives are taken as the primary sources of understanding and investigating the phenomena.
3. The phenomena are examined with respect to cultural or contextual circumstances (Walsham, 1995)

According to Guba and Lincoln (1994), ontology with Positivism’s position of naive realism, is assuming an objective external reality upon which inquiry can converge. In this study, all issues and problems have been understood through the application of scientific methods and theories, therefore positivism ontology has been used.

The epistemology of the research is based on the assumption that knowledge is value mediated and hence value dependent, i.e. Critical theory. The methodology is designed around the belief of positivism experimental methodology that focuses on verification of research problem and

objectives, as the principle of Lean philosophy needed to be kept as a construction to follow (refer to table 3.1).

Ontology	Positivism
Epistemology	Critical theory
Methodology	Positivism

Table 3.1 Paradigm of the research

3.2.2 Research Approach

In reasoning, there are two broad methods of approach that can be used in Research: the Deductive and Inductive. Deductive method works from more general to more specific. Inductive reasoning works by moving from specific observations to broader theories. It was determined that the Deductive method was deemed the right approach to the research, as the research started with the broad question of 'How Lean is implemented in HE?', working towards a more detailed research problem: sub-research problem, aim, and objectives.

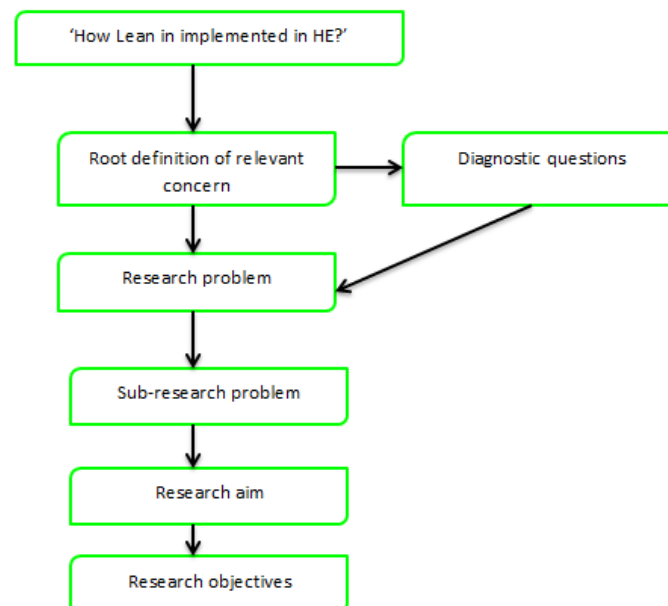


Figure 3.1 Deductive research approach

The study methodology started with the identification of structural similarities initially across manufacturing and then taking into consideration other service industries. The research seeks to evaluate the use of Lean principles in the HE service environment as there is currently little knowledge available about the Lean application in the environment. The lack of validated knowledge in this area made it impossible to describe the system in a quantitative investigation from the start, which presents the requirement for qualitative analysis to fully describe the complex system.

In parallel with the literature review, CUBIT has been used as a case for conducting real world research, aiming to study the prevalence of the Lean philosophy implementation in HE-service, situation, problem, attitude or issues. As stated earlier the application of Lean, the methods and approaches for identifying value, in Service and specifically in HE have been reviewed. This was followed with approving the need for a method or framework to capture and balance stakeholders' expectations at the outset of improvement project. This narrowed down further when observations are collected to address the Research problem as described in data collection and data analysis chapter. The model, based on Research problem, is then developed through validation of each intervention, prior to developing the next intervention.

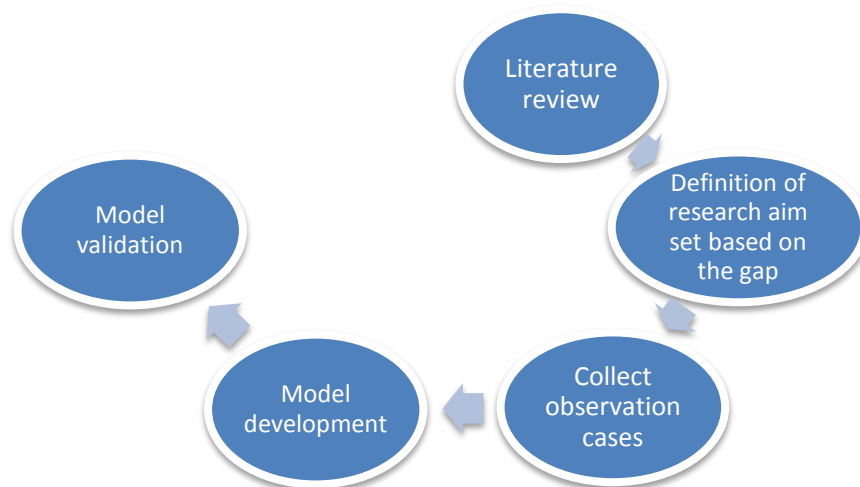


Figure 3.2 Overall Research design plan

3.2.3 Research Strategy

Research strategy based on Yin (2009) is divided to Experiment, Survey, Archival Analysis, History, and Case study. The comparison between them all is as follow:
 Some materials have been removed due to 3rd party copyright. The unabridged version can be viewed in Lancaster Library - Coventry University.

Table 3.2 Research strategy comparison (Yin, 2009)

The method of using a case study allows evaluation of a social phenomenon through analysis of an individual case whereby the case may be a person, group, episode, process, community, society or any other unit of social life (Kumar, 2005). Gathering all data relevant to the case and organising it as a case provides an opportunity for analysis and review of the details. Yin (1981) formalised the definition of what a case study is stating “A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.”

The use of case-study as a research tool for exploratory investigation and to generate new understanding, is well established within social science research (Yin, 2004). The use of a single or small number of case studies as knowledge building tools is increasing prevalent in operational management literature (Krishnamurthy, 2007). Case study research is particularly suitable for answering “why”, and “how” questions when researching contemporary phenomena in a real life context (Zakaei, 2010). Although case study is a well-established strategy in research, many researchers still disparage it raising the concern that it provides a basis for generalization (Yin, 2003). Yin (2003) explains that the short answer to this concern is that case studies, like experiments, are generalizable to theoretical propositions and not to populations. In this sense, a case study is not a strategy to provide a sample, but is a way to expand the theoretical facts, which from Yin’s (2003) point of view can be called ‘analytical generalization’.

As Benbasat et al (1987) highlighted the three strengths of this approach:

- The phenomenon can be studied in its natural setting and meaningful relevant theory can be generated from the understanding gained through observing actual practice
- It allows the questions of why, what and how to be answered with a relatively full understanding of the nature and complexity of the phenomenon
- It lends itself to early exploratory investigations where the variables are still unknown and the phenomenon not clearly understood.

Clearly the aim of using a case study is not to address universal forces; on the contrary, case study understanding comes from immersion in and holistic regard for the phenomena (Yin, 2003). The case study research is based both on quantitative and qualitative evidence and data. Yin (2003) differentiates between the types of use of case study:

- Exploratory; cases are used to define the questions and hypothesis of a subsequent study
- Descriptive; cases are used to provide a complete description of a phenomenon within its context

- Explanatory; cases are used to provide data collection and testing on the cause and effects of relationships.

In this research, the case study method has been used for its exploratory and descriptive use. As the issue of 'how Lean is implemented in HE?' was reviewed further, it was determined that the use of the case study approach could be seen as the most appropriate methodology, from two perspectives; - firstly, as identified by Eisenhardt (1989), 'theory development with case study can and does make a valuable contribution to research and can lead to novel theory generation'. Secondly, as identified by Orlikowski (1992), that 'in examining structures which are not located in organisations, but are enacted by users, the case study approach offers appropriate methodology for examining these complex interactions'.

3.2.4 Time horizon

A cross-sectional study is the study of specific issue or problem in a specific time. Adversely, a longitudinal study has the opportunity to be developed in the future i.e. its application is not restricted to a particular time (Saunders et al., 2012). This research is not limited to particular data within a time, therefore it is longitudinal study.

3.2.5 Data collection method

The approach taken in this research has gone through the cycle of Desk research (literature review), Observation case (CUBIT) and Data collection from 5 HE cases. The purpose of the literature review was to maintain an ongoing knowledge of current theory and practice within Lean implementation in HE. A secondary consideration was to adopt the knowledge, such that it could be re-interpreted and put forward, as areas for publication or public presentation. It was important as part of the literature review, as for the other methodologies, to distinguish between form and content. It was also proposed that an objective of the literature review was to provide background, perspective and knowledge useful in conducting the rest of the research (for instance, Table 2.32).

Voss et al (2002) confirm that there is a wide set of choices to be made in conducting case research, such as how many cases are to be used, case selection and sampling. Yin (2003) explains that the definition of unit of analysis, and therefore the case, is related to the way the initial research questions have been defined. Multiple case designs are used for comparing different instances of the same phenomenon (Yin, 2003). In this research the case is seen as the implementation of Lean within the HE sector. In considering the time frame during which the research was carried out, it was determined that five Universities would be active in the implementation of service improvement in Lean.

For collecting observation cases, the following steps were taken:

- Selection of cases
- Data gathering
- Data analysis

The five cases selected (Cardiff, St Andrews, Leicester, Portsmouth, Coventry University) represent the 'qualitative sampling' (Purposive), where the processes to be studied are most likely to occur. The five cases selected for research, had all started the application of Lean business, and two of them had a strong background of academic research in Lean.

The question of the ideal number of cases is complex. At a practical level, there must be a trade-off between the comprehensiveness of the analysis when compared to the time and whether the researcher has additional resources. On the other hand, the practical considerations which limit case pre-selection, i.e. the limited resources of a lone researcher are likely to restrict the feasibility of conducting simultaneous case studies. Yin (2003), describes how researchers should be guided by their 'sense of complexity of the realm of external validity'. In relation to this study, which was context specific, the study of the Lean principle implementation, specifically value identification by stakeholders, needed to be articulated. The studies from the selected 5 cases were conducted simultaneously.

During the data gathering stage of the research, detailed data collection was developed through phases of:

1. **Short interviews;** were used to learn about how the cases managed the stakeholders expectations and its variety, as well as develop a distinct potential research problem based on the stakeholders expectation in latter stages
2. **In-depth interviews:** repeated face-to-face/direct encounters between the researcher and informants directed towards understanding informants' perspectives on their experiences, as expressed in their own words' (Taylor, 1998).
3. **Producing case studies** followed by ongoing discussions to ensure the accuracy of the findings. As the interviews are best suited for clarification, the Case study was used for describing the decision and approach made on improvement projects, and specifically on the approach towards managing stakeholder involvement and requirements.

Interviewing, observation and analysing activities are activities central to qualitative research (Merriam, 1998). The primary data collection methods used were Interviews (Mason, 2005, and Merriam, 1998). Examples of these are shown in Appendix 6.1 to 6.10, which are represented as 10 case studies in chapter 4. It was taken into account that 'doing interviews within the case studies

involves an entirely different situation as rather than checking interviewer availability, the interviewer must cater to the interviewee's schedule. The nature of the interview is more open-ended, and an interviewee may not fully necessarily cooperate in answering the questions (Yin, 2004)'.

3.2.5.1 The methodology of designing the interview questionnaire

The questionnaire was used to collect data from primary sources in order to study the root definition of relevant concern within the literature review. The journey towards designing the interview questions were;

1. Defining the research aims (refer to figure 3.1)

The relevant literature has been collated, studied and the gap has been defined. The main aim of the questionnaire is to investigate and establish "the current knowledge about Lean applications and Value identification in a multi-stakeholder HE service", and compare the data analysis with the developed methodology.

2. Identifying the population and sample (refer to 3.2.5)

The sample size is based on 5 universities;

- ✓ Portsmouth University
- ✓ Cardiff University
- ✓ St Andrews University
- ✓ Leicester University
- ✓ Coventry University

3. Deciding how to collect replies (refer to 3.2.3)

The questionnaire will be completed by an interviewer, supported by the letter that was sent to the interviewee prior to the interview to explain what the research is about, how the data would be used and why its completion is of value (refer to Appendix 5 for the introductory letter).

Asking questions orally, enables the interviewer to include detailed conversational on any question that requires more explanation.

The first interview was a semi-structured interview with the aim of understanding the service activities and structure of the work.

The second interview was a structured interview with the aim of investigating Lean implementation in HE for improvement projects and to evaluate how value is assessed and co-operated in improvement and implementation.

4. Designing the questionnaire question

The areas to be considered when designing the questionnaire are:

- Deciding the information required
- Defining the target respondents, and selecting the method(s) of reaching your target respondents
- Determining the content of the questions and developing the wording of each question
- Put question in meaningful order and format, and check the length of the questionnaire (Crawford, 1997). Ordering the questions appropriately and defining the format prior to changing the length of the questionnaire.

The process of designing the questionnaire was split into:

- A.** Determine the questions to be asked, by linking the research aim with individual questions via research issues.
- B.** For each question, select the question type and specify the wording.
- C.** Design the sequenced of the questions and overall questionnaire layout.

The interview questionnaire was formatted into three main sections:

- Improvement
- Service improvement focus categorisation
- Implementation

In each section questions were designed around the issues of investigating:

- Where, how, and why the improvement project was developed/progressed
- Value identification, stakeholder involvement and satisfaction
- Implementation of the improvement

The area of investigation was focused on stakeholder representation, capturing and managing their requirements, and guiding the optimisation of the service based on identified value by stakeholders requirement. That was defined during the literature review as the root definition of relevant concern, as demonstrated in figure 2.6.1.

Issue	Question focus
Where, how, and why the improvement project was developed/progressed	<ul style="list-style-type: none"> • The specific area of improvement • The method used for improvement • Why the method being used was chosen • The reason for improvement • How long the improvement has been in place • The long term aim for the improvement
Value identification, stakeholder involvement and satisfaction	<ul style="list-style-type: none"> • Is the service: stakeholder, customer, strategic, or process based? Why do you think this? • Who does your service support: Customer (specify), Government, Supplier, wider part of university, Staff • Are you involved in assessing the effectiveness of the service? How is this done? • Has the service been effective? • Has the improvement enabled the service provider to accommodate stakeholders' requirements better? If no, what should have been done differently? • Is there any measure in place to confirm that? • Do you get your stakeholders involved in improvement? to what level of detail and when? • How do you communicate with your stakeholders?
Implementation of the improvement	<ul style="list-style-type: none"> • What activities been undertaken as part of the implementation? • What proportion of staff from the targeted service is involved in the implementation? • What types of staff are involved in the improvement? • What strategy been used to involve/engage stakeholders in improvement? • What training and development is being provided to stakeholders? • Have any specific tools and techniques been used? Are they new to you? • Was the improvement based on internal /external consultant? • Are you developing/training your in-house facilitator?

Table 3.3 The process of designing the questionnaire
(Refer to Appendix 6 for Evaluation of the improvement questionnaire)

B. For each question, select the question type and specify the wording

As stated, the main instrument used was a series of interviews, which comprised of open and closed type questions to accommodate all the topics in the research. Open-ended questions allowed the study participant to put their own interpretation regarding the answer. At this point insights into the evaluation of the management of value identification by the stakeholder were established.

Care was taken with the construction of the questions themselves. A few simple rules were applied when constructing the questions:

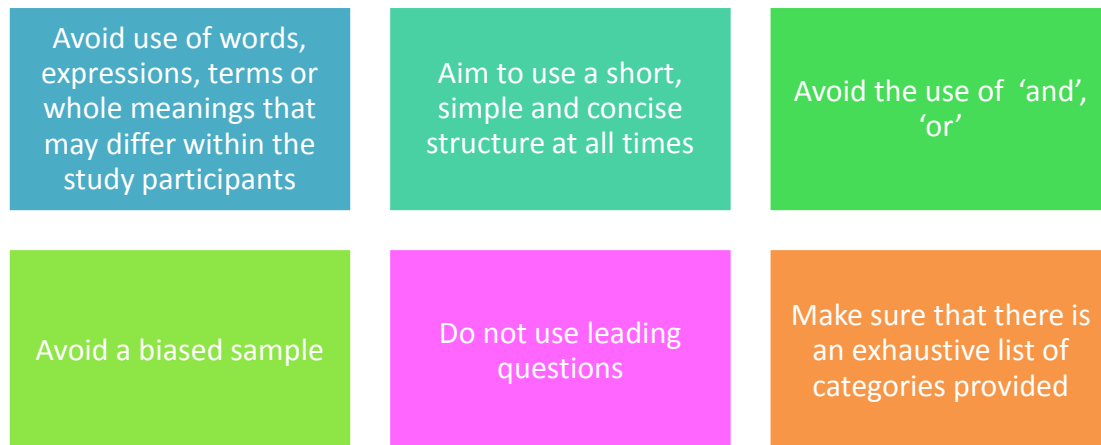


Figure 3.3 Rule applied to constructing the questionnaire

C. Design the sequence of the questions and overall questionnaire layout

Usually within a questionnaire, it is recommended that double questions, i.e. where there are questions in one, are not used. However when conducting the pilot survey, it was found to be easier to develop the information if some of the questions were double questions. As this allowed more detail to be discovered as the interview was face to face rather than being a self-administered questionnaire.

The target respondent covered the existing service provider and the service receiver within the frame of Service in the HE. The questionnaire didn't make any differentiation with regards to factors such as age, gender and nationality, but rather focused on each area of HE as an organisational/departmental decision to determine the 'improvement area' required.

5. Running a pilot survey

A pilot was run using the questionnaire, in the first interview (Coventry University Library) which enabled some of the questions to be converted from open-end to closed question while some needed to be improved based on the trial analysis carried out on the answers.

6. Carrying out the main survey, and analysing the data

The data collection and analysis process happened in three phases

Phase 1, Preparation for the interviews and focus groups

Phase 2, Execution: interview data collection, analysis, verification and clarification

Phase 3, Closure of the process

Refer to Appendix 6 for 'Evaluation of the improvement' survey. Each interview lasted between 1-2 hours depending on the organisation involved.

The analysis of the ten case studies was through studying the level of improvement (i.e. resolving inefficiency, removing waste, or improving the whole system), all stakeholders vs. represented/selected stakeholders within the project timeline, and evaluating the cases against the diagnostic questions (table 2.18). The detailed analysis of the cases is presented in chapter 5.

3.2.5.2 Ethical consideration

In order to ensure ethical consideration was covered, the respondents were required to give informed consent indicating that they would be happy to participate in the research. This is done via an introductory letter provided in Appendix 5, and ethical forms provided in Appendix 25.

3.3 Research Design

Yin (1994) defined the research design as “the logical sequence that connects the empirical data to a study's initial research questions and, ultimately, to its conclusions”. In other words, the research design is a blueprint (as shown in figure 3.4) reflecting the research question of what question to study, how to collect and analysis the data, and how to reach to the conclusion to address the initial question of the research. Checkland's (2000) Soft System and Meredith (1998) research cycle was used to design the research framework as shown in figure 3.4;

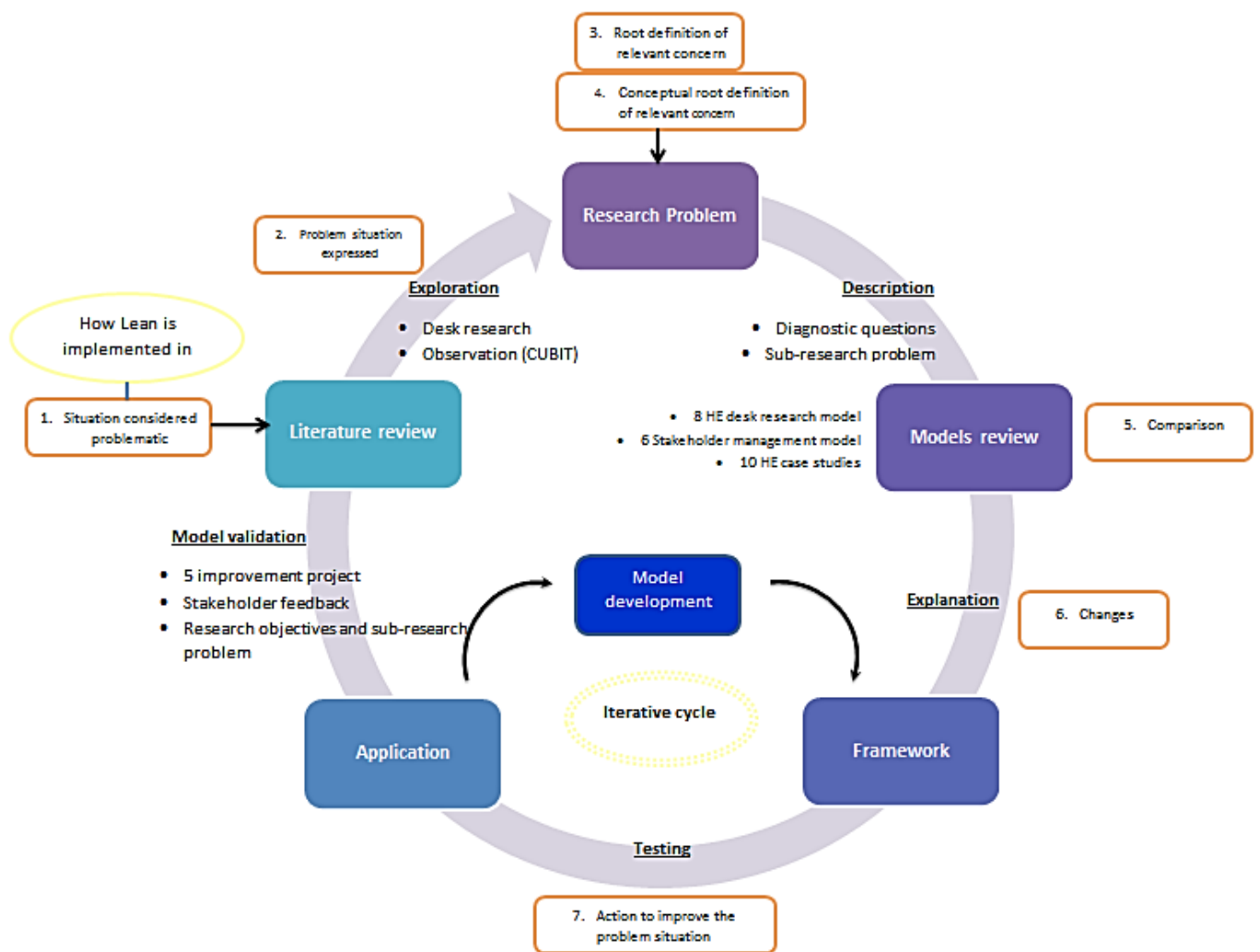


Figure 3.4 Research Framework

Initiating the research through investigation of Lean application in HE service, followed by the Literature review (Desk research), as well as observation through CUBIT, enabled the researcher to express the problem situation as root definition of relevant concern, from which the 'Research problem' was then derived. Dividing and describing the research problem into manageable steps, led to the development of 'diagnostic questions', and a 'Sub-research problem', which was used to compare and review the 8 Lean implementation models in HE (desk research), 5 Stakeholder management models (desk research), and 10 Lean implementation cases in HE (primary research).

The result reinforced the research aim and objectives as the changes required to be designed. Action was taken to improve the problem situation by working towards the delivery of research objectives. The model development went through iterative cycles of testing against each stage of the model within the improvement project selected at Coventry University.

The model further validated the 5 improvement project cases, by applying the model through all of the stages, eliciting project stakeholders' feedback, and comparing the sub-research problem and research objectives (Figure 3.5) with the model delivered result.

In figure 3.5, the research design presents the points detailed above and in figure 3.4 shows the flow of the research process and its milestones. To be consistent in studying the observation cases (primary research), Lean implementation in HE models (desk research), and Stakeholder management models (desk research), a fixed set of diagnostic questions (table 2.18) driven from literature review were used. While the literature acknowledged the importance of stakeholder involvement and the importance of capturing stakeholder expectations, the case studies reinforced the gap regarding the availability of a structured, formal approach/process. This led to using 'Model development' by action research within ongoing improvement project to gather data. Each stage was developed based upon the expectations of the previous stage, while each stage of the model was tested on a range of improvement projects through an iterative process.

Therefore it can be concluded the research methods to be employed are:

1. Desk research of published literature to establish the state of current knowledge about Lean application in HE service and managing expectations, and identifying potential alternatives for achieving the stated objectives
2. Structured & Semi-structured interviews with Cardiff, St Andrews, Leicester, Portsmouth, and Coventry University to understand the opportunities and constraints in the area of discourse
3. Action research within an ongoing improvement projects to gather data to facilitate the development of approaches of the stated problem
4. The development, application, testing and refinement of an analysed framework to determine the practicality and utility of the solution.

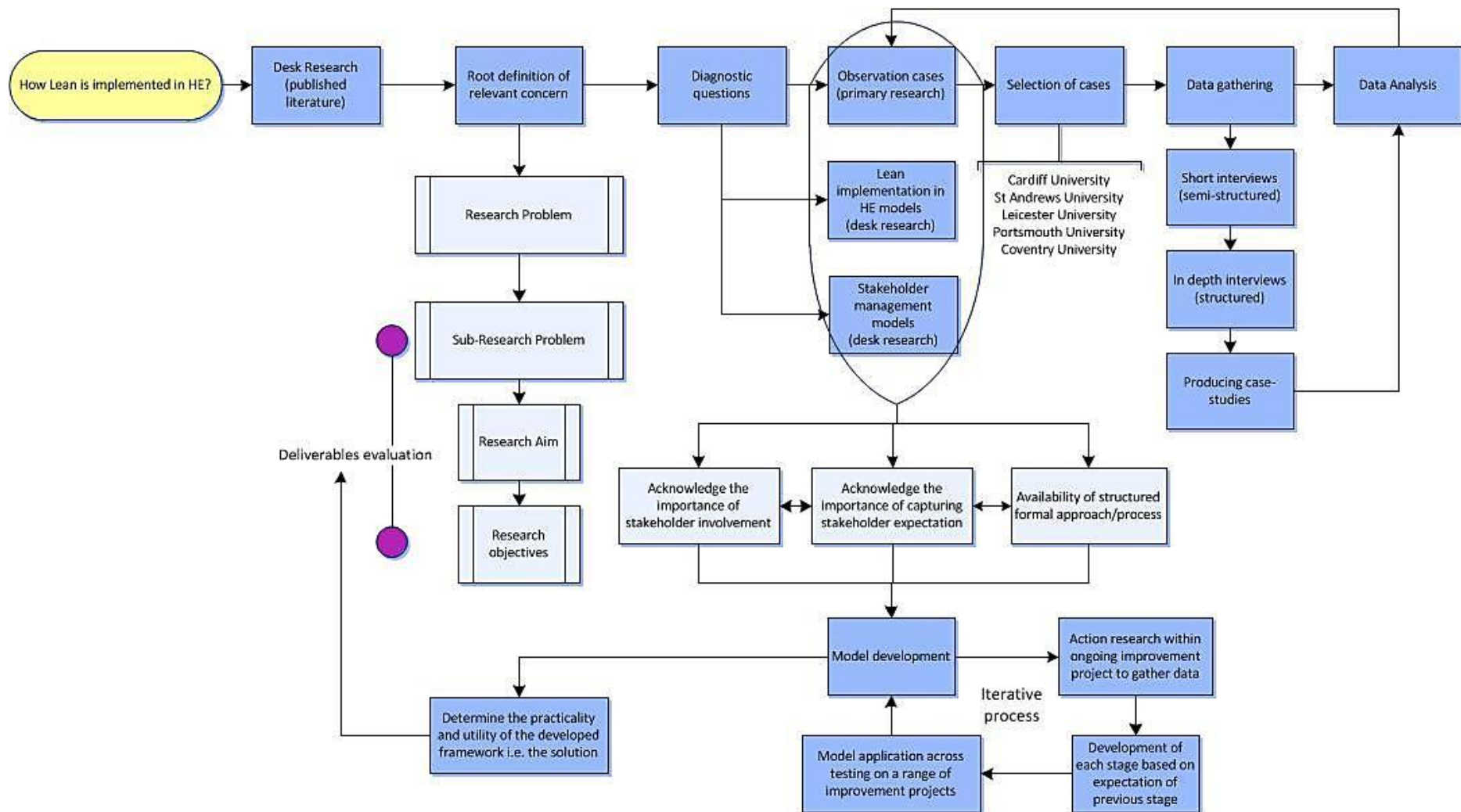


Figure 3.5 Research design

3.4 Summary

In summary, the stages that were followed to understand 'Lean within HE' were;

Stage 1 Applicability of Lean Management within HE service industry as well as highlighting value identification and customer/stakeholder differences between Manufacturing and Service.

Stage 2 To evaluate the identified case (gap) stated in Stage 1 and build-up case-studies. The case-studies will be based on set of semi-structured questions as a guide to prompt further questions and gather data on project improvements already made within the selected cases. Prior to the semi-structured interview, an introductory letter will be sent to the interviewee to explain the project and detail where and how the data will be used. By the end of stage 2, insights on the general concept of the model regarding acknowledging the importance of stakeholder involvement, capturing their expectations and availability of formal structured process is to be developed.

Stage 3 This stage develops the model through an iterative process while validating and testing each intervention (stage) on selected improvement projects.

Stage 4 Trialling the completed model within improvement projects to determine the practicality and utility (usability) of the framework/methodology.



Figure 3.6 The general review of the research stages

Overall the research methodology can be summarised within 5 main categories;

Research Methodology summary	
1. Research philosophy	<ul style="list-style-type: none">➤ Positivism Ontology➤ Critical Epistemology➤ Positivism Methodology
2. Research Approach	<ul style="list-style-type: none">➤ Deduction; Literature; theoretical review of methodology used currently in manufacturing and other industries, narrowed down to HE Service.

3. Research Strategy	➤ Case-study
4. Time horizon	➤ Longitudinal study
5. Data collection method	➤ Secondary source: publications ➤ Primary source: Interviews (short and in-depth) ➤ Producing case studies
– Editing data collected	➤ Minimise errors, incompleteness, misclassification & gap in the information obtained; by interface or recall.
– Data analysis	➤ Developing a frame for analysis both manually and by computer
– Solution	➤ Determine the new methodology to close the gap
– Test	➤ Validate the Model through the selected improvement projects
– Writing up an evaluation report	➤ Share findings with stakeholders

Table 3.4 Research Methodology summary

The aim, objectives and research problem are set out to give structure to the research. These are restated here for the purpose of clarity; the research problem is that in order for an improvement project to be perceived as successful from a stakeholder perspective, their requirements would need to be understood at the outset of the improvement project and that where complexity includes multiple stakeholders, with a number of objectives, these would need to be identified and prioritised. In order to provide consistent results and sustained improvement, this action should be an explicit part of the improvement methodology utilised.

The aim of the research is to provide a means of identifying and prioritising stakeholder requirements at the outset of an improvement project, such that, in meeting the business needs, the resulting outcome provides a 'better fit' solution for all stakeholders. The research objectives were designed to support the delivery of the aim as:

1. To establish a methodology in order to represent all stakeholders to an improvement project;
2. To develop a methodology to determine the importance of the stakeholder requirements and their relative importance;
3. To develop a means of specifying the value desired by each stakeholder;
4. To design and test a methodology that is able to inform an improvement project such that the project outcomes are aligned to stakeholder requirements;
5. To determine the utility of this methodology in improving stakeholder satisfaction with project outcomes.

Data Collection

4.1 Introduction

The chapter 3, provided the overview of the research methodology, which indicated after defining the research problem within the literature review and the observation of the Coventry University Business Improvement Training (CUBIT) project improvement (through improvement involvement as unstructured interviews), collecting data through primary study will be the next step. This informed basis for a survey to evaluate the gap highlighted in the literature review. This chapter focuses on case-studies that use improvement projects, to illustrate how Lean is applied in HE service and value identified within multi-stakeholder HE environment.

In this research a detailed data collection was developed through phases of:

1. **Short interviews;** parallel to the literature review the short interviews was carried forward through the short interviews with the area which were getting training in CUBIT for improving their area:
 - Business development team within the Coventry University
 - Online registration within Coventry University
 - Maintenance within the Coventry university
 - IT procurement within the Coventry university
 - Software Programming team 'UNIVERSE', within the Coventry university

This was through conducting initial real world research where the researcher involved into investigating the current methods in use for Lean implementation on improvement projects in HE. This was used to learn about stakeholder expectation and variety as well as to develop certain potential hypotheses based on the stakeholder expectation management. As the study was carried forward parallel to the literature review the structure of the section 4.1.1 does mainly reviews the approach taken, aim set, and challenges CUBIT faced with.

2. **In-depth interviews:** repeated face-to-face, or on the phone structured interview encounters between the researcher and informants directed towards understanding informants' perspectives on their experiences as expressed in their own words. The questions were design around the 3 main areas (as been explained on table 3.3), 'where, how, and why the improvement project was carried forward', 'value identification,

stakeholder involvement and satisfaction', 'Implementation of the improvement' (refer to Appendix 6).

3. **Producing case studies** followed by ongoing discussions to ensure the accuracy of the findings. Case studies were made for describing the decision and approach made on improvement projects.

The format of all the case-studies start with an introduction to the problem, which is the main reason for the improvement for the project being in place then it leads to the background of the service area in wider aspect i.e. where, how and why the improvement project was carried forward. Then the problem gets evaluated and explained in more details from improvement team point of view including how the value has been identified and stakeholder been involved, followed by process and steps taken within the implementation. Meanwhile, the service improvement focus categorisation gets questioned and reviewed; this is done to understand the contrast between the methods used for identifying value, and what is believed to be the service main focus i.e. the purpose of service being in place.

Following the same structure across all the case studies, enabled the development of comparative case in chapter 5, data analysis chapter.

4.1.1 CUBIT (Coventry University Business Improvement Training)

Within Coventry University Lean principles been applied to institutional processes since 2008 and C.I is explicit in the university's Corporate plan 2015 (Martin, 2011). However, CUBIT was not directly linked to corporate plan, and it was a bottom up operational change. CUBIT was an internal initiative, sponsored by Human Resource (HR) department and led by internal staff with Lean expertise, designed to engage and support staff colleagues from across the university in identifying and delivering improvements (Martin et al., 2012b). The CUBIT aim was to create a vision and change the mind-set for making everyone within the university a problem solver. And to put emphasis on one of the important pillars of Lean improvement as culture change, involvement as well as the time required to be allocated from everyone who is involved.

CUBIT was a bottom up improvement plan within the university. The Lean expert team includes academic staff with strong background in applying Lean in the industry (Martin et al., 2012b). The main aim was that staff be able to get hold of their own process for C.I (i.e. problem solving culture) and in result working towards the corporate plan for student satisfaction, global and sustainable university (Martin & Arokiam, 2012). The first team of trainee covered the wide range of staff from different area of the university (Martin et al., 2012b):

- Business development team
- Online registry (Advantage module)
- Customer service Estate department
- IT procurement &
- IT software programming, Student Record (UNIVERSE system) (Refer to Appendix 2)

The aim of problem solvers within the specified areas, led the project going through (Martin et al., 2012b; CUBIT, 2011):

- Training on Lean concept
- Introducing the 'Customer Value' concept from Lean perspective and question the what they can list as value from customer perspective, to facilitate the understanding of service purpose
- Question what stops them to deliver the specified value
- Use 5 why's to get to the root cause of the problem
- Map the current state of the service process

The first challenge that it was faced within the CUBIT workshop was the introduction of Customer Value within their daily work, as a main purpose of service and the link and impact they have on customer satisfaction. Losing track of customer value, and assume the activities is back office and do not impact customer was the barrier across the participant towards Lean thinking improvement.

The successful training within the first team led the CUBIT to start a new project with Business Development Support Office (BDSO) (Martin et al., 2012b).

- BDSO have a mixed portfolio of projects, not all of which require the same level of attention.
- The merger of the Post Award Project Support and Applied Research (AR) Finance (a positive move) and the central Finance restructure has resulted in overlapping/conflicting systems and processes which add to delays to progressing work and confusion for their customers
- The team is unable to proactively support Principal Investigators (PI's) as time is being wasted due to a lack of streamlined processes and unnecessary waste and as a result the number of complaints has increased.
- Failure to address these issues will not only de-motivate a hardworking and committed team and threaten BDSO's 'team working ethos, but will negatively impact the University's ability to achieve its desired AR targets.
- With both Central and AR Finance processes have changed and a need to continue to provide a service during a period of change, increased workloads and complaints urgent action needed to be taken to help reduce delays through duplicated or unnecessary processes.

During the whole process of CUBIT based on previous experience from the first group and team expertise in applying Lean in other sector the focus was on (Martin et al., 2012b; Martin & Arokiam, 2012):

- Asking right questions and assembling the right kind of information
- Understanding the system and process of the service
- Constantly developing and applying knowledge based on practice in different cases
- Empowering the participants to contribute

In studying the activities undertaken the conclusion drawn was (Martin et al., 2012b) that the more complex the process or system, where functional boundaries and multiple stakeholders were involved, the greater the likelihood that all of the relevant stakeholders would not be fully engaged, that their requirement would not be appropriately understood and that this could lead to a sub-optimal outcome for the project.


4.2 In-depth Interviews

The in-depth interviews were done based on the designed standard questionnaire with the aim of evaluating the improvement to investigate, how the value is assessed and cooperated within the improvement projects in HE Service. This is structured under the main headings of;


- Service improvement; which includes the introduction to the service, reviewing where, how and why the improvement been carried forward;
- Service improvement focus; which reviews the value identification, stakeholder involvement and satisfaction;
- Service improvement implementation.

The reply to the set of the questions mentioned on figure 4.1 and appendix 6, built the case-studies under the headings mentioned above, in standardised manner across the all cases. While the 'service improvement' section in each case-study presents the area of improvement, and the reason why it was needed improvement, the 'service improvement focus' section digs the improvement further towards understanding of who and where within the improvement project timeline were involved, how the value was identified and communicated, and whether the value identification has been done by involving, eliciting requirements, and feedback from the stakeholder who the service supports and serves.

Where, how, and why the improvement project was carried forward
1. Which area been improved?
2. How has it been improved?
4. Why did it require improvement?
13. What is the service you provide specifically in this improved process?
14. What is the level of its complexity?
A. Very Complex; numbers of stakeholders with number of functionality involved
B. Simple with few complex step; Few stakeholder, number of functions involved
C. Simple; Few stakeholder, only one function involved
15. How often does it repeat?
7. Is there any standard process in place for all improvements take place?
3. What method been used? And the key reason on why the method of improvement been selected?
33. Any specific tools and techniques been used? Are they new to you?
34. Was the improvement based on internal or external consultant?
35. Are you developing your own in-house improvement facilitators?
36. What drives your CI?



Value identification, stakeholder involvement and satisfaction
30. What types of stakeholder are involved in the improvement?
31. What strategy being used to involve/engage stakeholders' in improvement?
32. What training and development is being provided to stakeholders?
8. What was the value in improvement?
9. How was the value been decided?
10. How has the value been communicated?
11. Do you categorise your service
A. Customers
B. Stakeholders
C. Strategy or
D. Process base
12. Why is that?
16. Who specifically does your service support;
A. Customer (specify)
B. Government
C. Supplier (specify)
D. Wider range of university
E. Staff
F. Other (specify)
17. Who are your main stakeholders/ Customers for your service?
18. How do you understand your stakeholders' requirements?
19. Does stakeholders/customers' requirements aligned with each other?
20. What is the impact of it on your day to day and improvement decision making?
21. How do you communicate with your stakeholders?
22. Do you get All your stakeholders involved in improvement? If so in what level of detail and when?
23. How effective was the improvement towards the stakeholders' satisfaction?
1. Very effective
2. Effective
3. Neutral
4. Un-effective
5. Very ineffective
6. Don't know
24. If you selected 3, 4 or 5 why? (otherwise move to Q.25)
25. How have you assessed the effectiveness of improvement? (Is there any measure in place to confirm that?)
26. Have the improvement enabled the area of your service to meet customers requirement better?



Implementation of the improvement
27. What activities are being undertaken as part of the implementation?
28. What proportions of stakeholder from the service area are currently involved?
a) Fewer than 10%; Only process-owner
b) 10-50%; process owner, customer OR back-office staff
c) 50-75%; process owner, customer and back-office staff
d) More than 75%; all the service stakeholders
29. Does the process exceed the area of the service to any other part of the university?
5. For how long the improvement has been in place?
6. What are the long term aims on improvement? Have you achieved it?

Figure 4.1 The explored questions for case-studies

The interviewees were staffs or consultants who were managing the improvement or deeply involved in the improvement.

The interviews were done with 5 universities within the UK (refer to Appendix 7):

1. Cardiff University
2. St Andrews University
3. Portsmouth University
4. Leicester University
5. Coventry University

The universities selected based on their active approach towards project improvement within the HE service, using Lean philosophy. The interviews were partially on the phone and partially face to face, depending on availability of the interviewee. The evaluation of the improvement was the main aim and followed through the interview with special attention.

The interviews were all included in the Appendix 6.1-6.10, with detailed answer to each question.

University	Case Study	Improved service area
Coventry	CS1	Library, Shelving returned book
Coventry	CS2	Subject Assessment Board/ Program Assessment Board system
Coventry	CS3	Business Development Support Office, Payroll
St Andrews	CS4	Maintenance, State job tracking
St Andrews	CS5	Library, New books cataloguing
Coventry	CS6	BDSO, Purchase Requisition
Portsmouth	CS7	Finance, Erasmus
Portsmouth	CS8	Graduate centre, Referral
Cardiff	CS9	HR, Recruitment
Leicester	CS10	Maintenance, Estate job tracking

Table 4.1 Improvement project on case-studied Universities

4.3 Case-Study 1; Coventry University Lanchester Library

Lanchester library (Refer to Appendix 8) realised shelving returned books started to seem a problem when the numbers of waiting trolleys kept increasing in the Library. The problem brought to the manager's attention when the responsible librarians were working hard, but still the queues of books to be put in place were holding them back to provide the service effectively.

As the book gets scanned when it gets returned to the library, the online library catalogue would show the book as available, whereas it can't be found in specified shelf. In result, the referral had to go to library help desk asking for advice. Librarian will double-check the shelf and if the book still not found, the referral will be led to the trolleys (waiting to be served) to find the book, as the book most probably is waiting to be shelved. Meanwhile, the librarian asks the referral to fill the specific form on reporting lost books, if it's not still found in the trolleys.

4.3.1 Library Shelving Improvement

The service provided is "return to shelf" service, i.e. return books to the correct location. It is simple in case of level of complexity, while it repeats multiple times daily. The Senior Library Manager classified the service as 'simple', based on defining it with few stakeholders with only one functionality involved. As stated in the introduction "shelving activity on returned books" been work on as an improved project. The main reason the project improvement was needed, was the period it took the books shelved back in place was too long, and the measure to prove that was the number of trolleys waiting to be served. The problem occurred when the number of resource decreased by the decision made by top managers.

The methodology used for improvement was to invite an external consultant, following by developing in-house improvement facilitators. As the Assistant Director of public services at library stated; -

"We had 3 days of process improvement workshop, which introduced us tools can be used for improvement. Then we looked into the problem and designed the more efficient process."

The training was on basic version of Lean Six-Sigma by using Process mapping, SIPOC, 7wastes, Histogram, CTS tree (Critical to Success tree), fishbone diagram, which was selected by the consultant to be used.

While there was not any standard approach in place, after the project members were trained on tools, it was planned to use the current project improvement approach as a model for following project improvements.

The drivers of C.I. within service are based on:

- Core business aim i.e. providing excellent service to customer
- Quantitative measures on how well what was promised, is achieved
- Previous year statics for demands peaks-and-troughs

4.3.2 Service improvement Focus

The improvement project consisted of 10 staffs that represented all areas of the shelving process. The discussion was taken place with core staff (i.e. the provider of the end service within the process) explaining to them why the improvement was needed to take place. The main reception was pushing the work to the next level of the process and indicating the allocated job to that area is done, i.e. the book has been collected from the student in reception. It was needed to move from this mind set to team effort. 3 days of training was provided to the mentioned core project group, and within implementation phase, the project team briefed the whole library staff.

The value i.e. the main aim of the improvement was set on “Time” meaning to speed the activity of shelving by minimising the shelving time. Although it was mentioned the value had been decided based on the Key Performance Indicator (KPI), and the benefit affected the key stakeholders (i.e. staff, student, and library manager), the main driver of the project was doing more with less resource by designing more efficient process.

The aimed value was communicated to library staff but not customer, while the RIW reinforced the objectives for the core project members, the other library staff was briefed and then the project team had further meeting to communicate their role and responsibility for the implementation of the improvement.

To specify the scope of the project SIPOC map was made:

Suppliers	Inputs	Process	Output	Customer
Library user Library management	Library materials Trolleys Book sorter Book ends Kik stools Magnetic tags	Shelving	Library material on shelf Empty trolleys Statistics Rejects	Library users Lending staff Library management

Table 4.2 Adopted from Library shelving activity SIPOC (Coventry University, 2011)

The 'Customer' in this context has the equivalency of stakeholder. Within RIW it has been brought to attention that a fundamental principle of process improvement projects should be benefit occurring to the customers of the process. And to do this effectively it was needed to understand the area customer consider as important within the service. In the improvement, the CTS tree is used to break down the Voice of Customer. The VOC was listed internally based on project team past experience and looking from customer point of view. The needs were listed parallel based on "Library management" list and "library user" list. Within the list the area set as important were:

- 1) Timeliness
- 2) Accurate
- 3) Quality

To create a smooth flow of books through the process, the activities within the process must be balanced according to the rate of customer demand. In order to compare the cycle time between the activities the "Run chart" used by the team, with the aim of enabling the team to re-assign tasks and re-allocate resources across the process. Meanwhile within process of improvement the layout been looked into to remove inefficiency within the process. Following to that the 7wastes was identified within the process.

The service is categorised as 'Customer' base, and the reason provided was serving the customer is the core business aim, and if the demand is not delivered the service will be questioned. However, setting the value approved the service is based on failure customer demand. Setting service solely based on failure customer demand while it has been mentioned the service supports main stakeholders i.e. staff and students, builds a contradiction.

Setting the improvement of the service based on failure customer demand, the method proposed for understanding requirements are only for customers. The elicit of customer requirements as it has been mentioned are not through their involvement, and the proposed logic behind this decision is; -

"What customers are interested in is receiving the output, regardless of how it gets there. Thus, a customers' perception is built on the outcome of the process, although in reality the performance is determined by the way, in which the hidden process operates. Therefore, it would be more important for the whole team within the organisation to gain a common knowledge on end-to-end process and their impact on the overall process i.e. to clarifying what actually happens rather than what should happen to uncover the waste and duplication."

The ways of communication for raising issues by students are student union, student focus group, and department/faculty board of study. For raising general feedback, there is a forum in place. The

preference is to get student body voice rather than single person voice to eliminate the clash between the requirements from the students. If the raised requirements are aligned with the library set core business it will be reviewed to improve the service, however if it is outside of the core business, it will be dealt separately as one-off demand.

All the stakeholders do not get involved in the improvement project, as it is believed they need different things and developing a system that reply to extreme demand is demanding and costly. While it is emphasised the core for business is to balance the budget and resource with the approved needs.

It is not known how effective the approach has been towards stakeholders' satisfaction, as there is no stakeholders' satisfaction measure in place for before and after. However, it is known that if there is any issue within the service, students and staffs can fill the related form. There is a database for recording and registering these issues and the action is aimed to be taken place within 5 working days.

The effectiveness of the improvement was assessed based by comparing the aim (return to shelve within 24hrs) which was set at the start of the project. Although the aim has not been achieved yet and need to review why, but it is believed based on the expertise of staff the improvement been successful and that has made the library to meet the customer requirement. Even though, the peak times seems to be still a problem.

4.3.3 Library shelving improvement project implementation

Based on the problem the core-group of staff been trained which enabled them to solve the problem. The implementation gone through the steps of:

- Communicating,
- Training the other staff, and
- Developing teamwork between the steps of the process rather than using the previous pushing system in place.

The activities, are being undertaken as part of implementation were as follow (refer to Appendix 8.1 for implementation plan):

- 1) Decide the area requires improvement
- 2) Training through workshop
- 3) Design the solution; the solution been designed from library improvement team as they operated it and they believed it needed to be operationally viable. However, "we had customer in mind" as the Library Assistance Director, mentioned.

- 4) Make an action plan
- 5) Assigned responsibility to 10 of staff who were representing all area of the shelving process
- 6) Arrange briefing session with staffs in the library
- 7) Communicate with other staff who might have been effected
- 8) Map the operational interaction
- 9) Running through the procedures
- 10) Implementation review; - Daily, to weekly and at the moment it's only after the peak time
- 11) Made some adjustment to staff model; - i.e. by planning in advance for peak time if it's predictable and if it's not be prepared by having the flexible staff contracted to be called in when it is required.

The proportion of involved stakeholder in pre-project and initiation stage is fewer than 10%; indicating only process-owner i.e. end service provider library staff was involved.

Stakeholders	Represented Stakeholder in Pre-project & Initiation Stage
Student, Library staff, University staff	End service provider library staff

Table 4.3 Service stakeholders vs. represented stakeholders in pre-project and initiation stage case 1

The process itself does not exceed the area of library to any other part of the university. And within the library the assigned responsible staffs for improvement were the ones who represented every step of the process. There was not any specific strategy in place for engagement rather than the communication with core staff (end service provider staff in initiation stage), regarding the main reason for change, and then based on that the action group been formed.

The improvement has been in place for an academic year, and as it is mentioned there is not known how effective the approach has been towards stakeholders' satisfaction, as there is no measure in place for before and after. The long-term aim is to return books to shelves within 24 hours, which has not been met yet and need to be reviewed. Despite of having a standard operation in place it has been a realization that the process does not respond well because of the reduction taken place for staff number. This had a direct impact on staff availability and workload on peak time.

4.4 Case-Study 2; Coventry University, SAB/PAB System

SAB (Subject Assessment Board) /PAB (Program Assessment Board) (refer to Appendix 9), old system was very paper based, in a way that secretaries had to print on broad sheets and taking the SAB/PAB tables to the meeting. Each printed document needed to be hand-authorised by academic, and any changes on each meant to redo the whole paper base process over again. The inflexibility on changes had effect on increasing the duration of completing the process enormously. This had direct impact on what students were getting as output for their mark. They had to wait longer as well as the accuracy of the output was low.

4.4.1 SAB/PAB Improvement

The Subject Assessment Board (SAB) is responsible for approving the marks of particular modules, while the Programme Assessment Board (PAB) is responsible for determining the progress or otherwise of students at intermediate stages of courses and decisions on awards at the final stage. The old system is classified as very complex, in which the complexity is mentioned to be decreased enormously after the improvement. The Project manager classified the service as very complex as the service has numbers of stakeholders with numbers of functionality involved. The SAB and PAB service on average for the standard undergraduate happens twice a year and for standard postgraduate three times a year. The old system consumed admin staffs, academic staffs, external academic staff time on the paper base process which calculated as £100k, therefore it was decided the need to slim down the process based on time and cost factor.

The improvement project did not follow any standard process, as it believed depending on the project and whether it is managed internally or by external guidance the improvement process can differ. The tools has been used within the improvement was mainly Swim lane (which training was provided on it) and Web based techniques which were IT and Programmer responsibility and no training was provided to other project team members. The step-by-step (low level) of the process has been analysed by using Swim lane and dependency diagram to clarify how many times the information has been passed, leading to future state map. The improvement was led by external consultant, continuing with IT having meeting with registrar every two weeks for getting feedback and identifying area of further improvement. The method was used purely based on knowledge and experience of the external contractor.

The drivers of C.I. within service are based on:

- Feedback from students experience and
- Business need of university based on the changes on
 - Budget &
 - Resource

The system changed to web-based application, which enabled to:

- Have meeting on projectors, (run meeting on the electronic version)
- Download the statistics (to get statics electronically)
- Do the amendment live, while having less error on the results
- And It is connected to central data holding system i.e. “UNIVERSE”

4.4.2 Service improvement Focus

The improvement had been managed by an external consultant and internal Business Analysis to study the step-by-step (low level) of the process and analyse. The project team was made of admin staff, IT and process improvement team (Business analyst). For the other stakeholders, training on how to use the new system was used as a method for their engagement to the project. The training manual, online video for faculties and a separate training for academic as well as review documents as a reminder for how to use the new system was developed for introducing the solution.

The value is identified as ‘reduce student complain through error reduction’ (which has not been originally identified as objectives), with more efficient and intuitive exam board, and with less of a drain of staff resources and in general being more cost effective. The value was defined by step-by-step process analysing, which led to finding the flawed area.

The value was communicated with stakeholders i.e. as mentioned ‘Faculty expert, central registry expert, business analyst, External IT programmer, internal IT programmer’ by demonstration of the improvement and how to use the new system.

The service is categorised as a Customer and Process based, because the main drive is customer and it has been identified through the process. The service believed to specifically supports Customer i.e. Students and Staff as the main stakeholder of the service. Despite of what been mentioned, and the fact that SAB/PAB system is used by:

- Exam board; for quality assurance and Decisions to be made

- Admin Registry ; to ensure the correct students are on cohort, submission made on time, and ensure correct mark been typed in and in general do data integrity
- Lecturer/program manager; to check the quality of module marks, good distribution, % of fails and % of distinction in order to decide whether to keep or move the marks for all cohort.

Still not all the stakeholders (i.e. Exam board, Lecturer, Program manager and student) had been involved in development of the solution at the outset of the project. The approach taken to understand the stakeholders' requirements while analysing why the errors taking place, was as part of the analysis the improvement team looked at student feedback through:

- Reception query
- Directly to admin support
- Tutor or lecturers
- Chairs action set up to fix an action

The indication of stakeholder requirement alignment mentioned by Business analysts as *"Staff does the input and review to the system and it expected to be accurate and efficient, on the other hand Students get the output and they expect it to be ASAP and accurate, which indicates the stakeholder requirements are aligned"*. The impact of this alignment is mentioned as; -

"Previously we had to get marks from academic, now they put the marks directly to the system. No print required either, and marks can be checked and amended even 30min before the meeting which help us to be accurately as possible."

The communication with the stakeholder in general is through face-to-face, email, Moodle, student forum meeting, and personal tutor meeting. However, it was highlighted as the process that has been improved was behind the scene, and the stakeholder and customers were not directly involved but it was looked at the area of their concern by going through customer feedback and corporate it on the improvement.

The improvement believes to be effective towards stakeholders' satisfaction, and the way proposed to assess that was through having less negative feedback and the fact that the improvement speeded up the exam board process, which in result made the exam result to be released quicker. This expected to make the result to be released quicker and more accurate for students to meet customer requirement better. For customer satisfaction there is not any measure in place either however, the reduction of negative feedback and the increasing speed of process taken to an account as a sign for improvement.

4.4.3 SAB/PAB service improvement project implementation

The problem been raised to the attention by external consultant on the opportunity made by the university for improvement. By the process review of the SAB/PAB the business analyst team realised it takes too long, while the process is not offering any flexibility to users and the output is not within the customer expectation on timely manner as well as the accuracy. The activities have been undertaken as parts of implementation were:

- Team of business analyst, internal faculty expert, and external consultant analysed the process
- Review of the process as it is and as it needs to be
- Business analyst and Faculty expert designed the new process
- IT specialist got involved to make the designed process translated to an application
- Programmer to work on relevant screen step by step as it was getting developed by Business analyst and Faculty expert
- Faculty expert test it from a user point of view
- Amendments made
- Start the same process on next step for next screen, to be developed
- Communicate the new system
- Training and introducing the new system

In pre-project and initiation stage, less than 10% of service stakeholders were involved in the project even though the process had impact on the whole university i.e. every faculty.

Stakeholders	Represented Stakeholder in Pre-project & Initiation Stage
Exam Board, Admin Registry, Lecturer, Program manager, and Student (across the Faculties)	Admin Staff

Table 4.4 Service stakeholders vs. represented stakeholders in pre-project and initiation stage case 2

The project ended 2years ago, but since the implementation started, it has been a 6 month now. The long-term aim on the project was to reduce the time, and mistakes as well as negative student experience. The old system had effect on student experience, but the new system enables the staff as soon as they get the marks they can amend and check.

4.5 Case-Study 3; Coventry University, BDSO payroll

In Business Development Support Office (BDSO), the service provided is gathering the payroll data to complete the claims to get external income in for the university. The problem raised by realising the time for chasing the HR, waiting for an assistant accountant to pass them the data on payroll was increasing, and that was because they couldn't get the payroll data consistently. The estimated waste per year was 2061 days (224 project affected x 4.6 N.V.A days per claim x 2 claims per year per project), which by the improvement is reduced to 69.7 person-days per year. The communication and responsibility channel between HR, Faculties, and BDSO is as bellow;

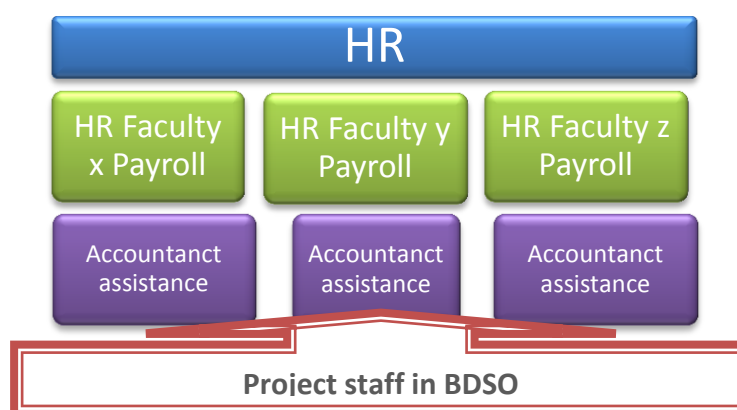


Figure 4.2 Communication channel between BDSO, HR and Finance

From HR the payroll gets split based on faculty and that gets to assistance accountants within BDSO and then the project staff had to get data from 3 different accountants. In this situation there is a risk of not being able to get the required data if someone in HR or assistance accountant in BDSO is absent.

4.5.1 BDSO payroll service Improvement

BDSO is a service established by Coventry University to help members of staff to secure and deliver externally funded activity. (Refer to Appendix 10). The service as it is dealing with payroll data, holds level of sensitivity, which in result left only certain people having access to the data. In previous system, assistant accountant could only access the data from HR, but in new system the assistance accountant and project manager have access too. In case of complexity, the service is classified as simple with few complex steps. The project manager believed the service has few stakeholders with numbers of functionality and in result is simple with few complex steps. The service is delivered between 1 and 6 times per month for each project.

Based on the problem for not being able to get consistence data required for the project on payroll, the BDSO team improved the process from two different ways:

1. Made the process consistence; by checking the process from HR, to find out who the payroll information is sent to. In some cases surprisingly realised one case been sent to 3 different assistance accountants and some of them has not got any responsible person allocated to it.
2. Automated the system; added a new part to be linked to BIDS (database of the BDSO projects) system, so that everyone i.e. project manager and assistance accountant can have access to the same info and the BDSO team can align people to the project and ask for data to be put in the system, while the access of data can be checked and set.

The main reason for the change was the time wasting within the system, and the fact that BDSO team had to wait, until the payroll realised the data is required by them. The standard approach used for improvement, was using A3 map throughout and after the improvement. The tools have been used within the improvement beside the A3 mapping, were 5whys, and SIPOC (to categorise stages of the process and highlight the wastes). The improvement had been managed internally, by one person from BDSO while it is on agenda by using A3 encourage more people within the office to get leads on improvement. As it was explained, the Continuous Improvement (C.I) is derived by:

- Gaining knowledge of how the mechanism of problem solving works; before when the problem encountered, people knew something was wrong but there was not a way to on improvement, now when the problem comes up by using A3, staff became problem solver.
- Development Performance Review (DPR); in which the BDSO staff past year performance will be reviewed based on their set goals by the manager, and new aims will be set for next year.

4.5.2 Service improvement Focus

The stakeholders who were involved within the improvement project were IT, HR (information manager), BDSO (Assistant Accountant, and Project managers). The method used to involve the stakeholder were by explaining the benefits of getting information from assistance accountant and knowing who should be aligned with in each faculty. No training was provided to the stakeholders regarding the tools or the use of new system, as the assumption was the system is in place therefore people will use it.

The “Value” was “Time” and the reason for that was the inconsistency in process took the project staff on BDSO team too long to get the required data. The value has not been communicated to the

stakeholder, assuming by using the new system in place they will realise the process requires less time.

The service is categorised as Strategy and Process based, because it is internal to BDSO team, even though it assists the customer i.e. PI (Principle Investigator) as well. The service supports wider range of university, and the stakeholders can be classified as:

- Senior managements; use the service to check income
- Funders; use the service to check accuracy of the claim
- PI; require the service to make sure their project is running well.

Despite the fact that the service supports wider range of university, as it was assumed the improvement is behind the scene (internal), and they will see the result of a faster outcome after improvement, not all the stakeholders (i.e. PI-academic, Funders) been involved in the improvement. Even with the selected ones who were involved (i.e. HR, BDSO), the rest in their team have not been informed or trained on the new system. In general term, the requirements from stakeholder are specified to be understood through their past experience, income target and informal feedback:

- Senior Managements; they give BDSO target on the income and they need to meet that
- Funders; The expectation are known by experience
- PI; From experience and informal feedback

Having had put the requirements based on experience and target, there was not any clash on requirements alignment within the project. In result, the proposed solution believed to be the exact improvement, which was expected by the stakeholders.

The communication channels in place for BDSO to communicate with stakeholders as it was explained are only based on after the improvement communication:

- Senior Managements; they are quite removed from this improvement
- Funders; they get data more in timely manner i.e. no hold up on claims, the communication are through email and post
- PI; the communication is based on letting them know their claims gone in via email/post as well as the monthly meeting

The effectiveness of the improvement towards the stakeholder satisfaction was graded by the project manager as neutral, as it is believed the output was expected from the service, and the improvement only freed up the staff time therefore this behind the scene improvement does not

seem effective to the stakeholders outside of the BDSO team. The proposed assessment is not based on any measure. Nevertheless, it is still assumed the improvement enabled the team to meet customer requirement better, by doing the claims more accurately and faster.

4.5.3 BDSO payroll improvement project Implementation

Having had the problem on getting the data it was getting stressful and time wasting on processing the claim to the funder. By reviewing the process and make the process consistence in communicating clearly with HR in a way, that to know who specifically is getting the data for the payroll on each specific project, in Assistance accountant team. The second part of the improvement was to automate the system. This is done by adding a new part to be linked to BIDS (database of the projects) system so that project manager and assistance accountant can have access to the same information and the BDSO team can align people to the project while asking for data to be put in the system, and check the access of data setting.

The activities were undertaken as part of implementation was:

- Done A3 for problem realisation and designed the new system
- Communication with HR to get data on who the payroll been sent to
- Ask them to get it updated
- IT involvement, meetings on security and sensitivity (the new system needed to be linked to BIDS system)
- Communicating it to BDSO team
- Meeting with manager and cover how the system works as well as reinforcing it on agenda of meeting to check whether they use it or not

Although it has been mentioned the HR, and Finance been involved in the improvement, but going through the steps of the improvement highlighted only after the solution been designed by the number of BDSO team, it was communicated with HR to get the data and IT to develop the changes.

Stakeholders	Represented Stakeholder in Pre-project & Initiation Stage
BDSO, HR, Senior management team, Funders, PI, Finance	Selected BDSO member, HR manager

Table 4.5 Service stakeholders vs. represented stakeholders in pre-project and initiation stage case 3

And it was only after the development of solution that it had been shared by the BDSO team and management team while the rest of stakeholders have been left out. The improvement only involved 10-50% of the stakeholders (i.e. process owner and back office manager), while the service did exceed to other area of university such as HR, PI-Academic and Finance in addition to BDSO, and externally to Funders.

For the first part of improvement, i.e. checking the consistency, the improvement has been in place for 10 months, and for the second part of improvement i.e. automated system, the improvement has been in place for 9 months. The waste per year decreased from 2061 days to 69.7 days (based on 224 number of projects x 70 min per claim x 2 claims per year per project= 31'360 min = 69.7 days).

The long-term aim of the improvement is claimed as set to have data available for everyone faster. It is predetermined, as no issue has been raised so far as complain although there have been feedbacks, the aim understood by project manager that has been achieved even though it is believed there are still area to improve.

4.6 Case-study 4: St- Andrews Lean team, estate job-tracking project

Lean in St Andrews is implemented in two ways:

1. Lean projects
2. Lean training (Refer to Appendix 11).

The estate job-tracking project was carried forward as Lean project improvement by the Lean improvement team.

4.6.1 Estate job tracking service improvement

The service provided by the Lean improvement team covers three main areas of the process, training staff and overall culture. It explained by the project leader that as the people involved within the improvement projects have different level of willingness for change the improvement project usually, starts very hard. The project leader classified the service as simple, reasoning it has few stakeholders and only one function involved.

The state job-tracking project was based on the maintenance work of trades working on the university estates. The process was paper based and took them on average 4 hours in total to get to the next job and then close the case. The drivers for the improvement was the need to change the estate culture going from reactive to proactive, i.e. checking things before they go wrong.

The university itself is first Scotland university and the third oldest in English speaking world. The maintenance and repair service is under the “Tech and Administrative service” section (refer to Appendix 11 for range of provided service).

The service they provided depends on to what level of emergency the request is classified:

- Urgent and emergency request
- Routine work requests (St Andrews, 2012b)

The Routine work request needs to pass to the Building Reporting officer, Residence Manager or Residence Assistance Manager in order to get passed to maintenance team by filling the “Work Requisition Form”.

In the new system, the paper-base system (i.e. 4hrs) changed to electronic system, by providing PC and printer (which saved 21 min per job). In average in old system, it took 44 days from informing the trades to finishing the job, but in the new system the time is decreased to 14 days, the difference is equal to freeing up 4.5 full time equivalent trades-people. It is important to mention by the improvement no one lost job. The solution was mainly estate idea while the Lean improvement team only guided them in right direction.

The standard process used in all improvement is the St Andrews Lean improvement 8 step model (refer to Appendix 3). Having said that, not always everything goes through all the steps for instance there might be a need to skip the training step. The methods used specifically in this project was running a 5days RIW with selected estate staff to map the current process and gathering ideas, following by future and ultimate future plan. The tools used with in the workshop were:

- BOSCARD (Background, Objectives, Scope, Constraints, Assumptions, Risks, Deliverables)
- Process mapping
- Nominal Grouping techniques
- Analytical tools like SIPOC
- Mind mapping and Rich pictures
- Matrix prioritisation
- Visual management
- Quad of aims

Internal improvement team led the improvement, while the university has the aim of involving all members of staff across the university in continually improving their own process. So far over 200 staff from every school and unit has been involved directly in at least one Lean project, with many

more staff having been consulted in the process of redesigning and assisting in the implementation of the projects coming from Lean.

According to the project leader the driver for C.I. is:

- Economic situation
- Competition between the universities
- Meeting the aim and KPI's of the University

4.6.2 Service improvement focus

The stakeholders who were involved within the improvement project were frontline estate staff, supervisory staff and senior level estate staff. The frontline and supervisory were mostly involved but the senior level staffs were put in just time to time to see the result of the improvement at the time. The strategy used to involve the specified stakeholders in the projects was through getting to know them, tell them about the Lean improvement team experience, and the stories, as well as increasing the level of trust. The training provided to the team started with introduction to Lean, Lean training to managers, Lean training to admin, problem solving techniques, Lean tools and managing change.

The specified value for the project was “free up trades time” and therefore being more cost effective. The value was identified based on standard Lean fundamental, respect for people and C.I.

Following to identifying the value, meeting with estate managers been put in place for communicating value, and then decide who needs to be involved. Selected frontline and supervisory estate staff, build the project team and been trained on Lean and then was introduced to the project and what the Lean improvement team thought to be a solution to get their opinion on it.

The service is mainly mentioned to be ‘Customer’ and ‘Process’ base as for instance, if there is a broken window estate would be responsible for H&S problem and it is believed to be Process based because the activities built the process, however the strategy in this case is more flexible.

The service support 60% of students and 40% of staff, while the main stakeholders of the service are mentioned as:

- administrative unit,
- academic
- student, and
- The supplier of parts to the university

None of the specified stakeholders were involved in the projects, even if in the 8 step model customer is one of the members shown partially to be involved in the improvement project in certain points, but in this project wasn't involved in any level.

Having said that, it was mentioned by project leader that all the stakeholder have a fixed requirement, "want things to work" and that should make their requirements aligned, which means no structured method was in place for understanding stakeholders requirements. This was resulted the assumption of what must be needed, and as the requirement is assumed in general term the second conclusion was driven by project team that stakeholders' expectations are aligned.

Specifying the customer, i.e. 'students always win in getting what they require from the service', with not eliciting their requirements highlighted the contradiction in the approach for improvement.

It has been mentioned that stakeholder and specially customer needs to be involved in project the same level of details as staff member as no idea is a bad idea, however it was explained further that this is not the current approach and it needs to be looked at.

It was believed by project leader that the improvement was effective towards stakeholder satisfaction, while no specific financial figure was identified for the improvement objectives a saving of £40k was realised. Meanwhile, the significant reduction in processing time is believed to enable the service to meet customer requirements better.

4.6.3 Estate job tracking improvement project implementation

The project started by employing the Lean improvement team, followed by selection of the project team members and training on Lean and implementation. Within implementation based on St Andrews model, further actions were taken by the team member.

Less than 10% of stakeholder (i.e. process owner) was involved in pre-project and initiation of the project. Even though, the service is provided across the university, but the project leader believed that the process of service does not exceed to any other area of the University.

Stakeholders	Represented Stakeholder in Pre-project & Initiation Stage
Estate technical and administrative team, Academic, Student, Parts supplier	Frontline supervisory and Senior estate staff

Table 4.6 Service stakeholders vs. represented stakeholders in pre-project and initiation stage case 4

This shows looking at the process isolated from upstream, downstream, and other stakeholder who are involved in the service.

The improvement had been in place for 18 months since the implementation, with the long-term aim of estate staff having more proactive rather than reactive approach to get control over their time and be more efficient, and cost effective. The project manager expects by improvement be in place 4.5 trades-men free up (i.e. salary+ full economy cost) would be the amount of £40k per person, which would make the university:

- More effective and efficient, and
- level of the responsibility will raise,
- people can change and work on improvement,
- Respect for people.

There is no measure in place to prove the claimed made for the benefit in the project leader rather than the expectation of removing inefficiency in the process will lead to freeing up the tradesman time.

4.7 Case-study 5; St- Andrews University, Cataloguing Books Project

The library had a chance to buy new books, but the new books piled up in the library waiting to be catalogued manually to the system. The workload was worth of 3 months of work for the number of resource at a time to remove the backlog. (Refer to Appendix 12).

The people who they offer the services to are; Students (Undergraduate and Postgraduate), Staff, and Admitted readers (i.e. member of the public who are welcome to use the University Library for reference purpose before and during the examination time).

4.7.1 Cataloguing books service Improvement

The service is in place to provide the students access to the books. The service is simple and every now and then when the new books are bought needs to be repeated. The project leader classified the service as simple as it is considered with few stakeholders, and only one function involved in it. The typical new book record incorporates the following elements:

- Author entry
- Full title transcription
- Full imprint transcription
- A physical description (pagination, illustration, and height)
- Basic subject entries (cited in, provenance note, binding)

- Collection-specific identifiers (subject, genre, add author)
- Accurate holdings statements (class mark and itemised barcode)

The problem highlighted by the 3 months of new books backlog to be catalogued piled in the library. On average staff could scan i.e. put the new book information in the system 2 books/hrs and with cut out the interruption, they could do 3 books/hours. The aim was to catalogue all the new books in a day rather than 3 months, and the reason behind that was the books were blocking the lights and taking place in the library and the level of staff stress was rising day by day.

The additional reason for improvement was also the student access to the books. Students could not access the books on shelf even though the library database was showing the book is available. Students needed to search for it and then wait for 20-30 min until the book is catalogued before they could take it. The books were like an inventory with the negative effect of money tied up.

The improvement were based on the standard St Andrews 8 step model (refer to Appendix 3), on the Lean project steps. The methods used within the improvement project was RIW which ran for 5 days with selected library staff, mapping the process, gathering ideas within the workshop, and mapping the future. The range of tools used with the workshop was:

- BOSCARD (Background, Objectives, Scope, Constraints, Assumptions, Risks, Deliverables),
- Process mapping
- Nominal Grouping Technique
- Analytical tools like SIPOC
- Mind mapping and Rich pictures
- Matrix prioritisation
- Visual management
- Quad of aims

The improvement is run by internal Lean improvement team, while the university is aiming to involve everyone across the university to be trained in Lean and become a problem solver of their area. The driver behind the C.I. can be mentioned as economic situation, competition between the universities and the set KPI's.

4.7.2 Service improvement Focus

The project team consisted of front line library staff, and supervisory team who were mostly involved in the workshop, the senior library managers were involved only on result of the

improvement. In order to engage the selected stakeholder within the improvement project, the Lean improvement team allowed a time to get knowing each other and telling them about the experience and other projects to increase level of trust.

The training provided to the team started with an introduction to Lean, Lean training to manager, problem solving techniques, Lean tools and managing change.

The identified value for the service was access to stock worth £80k. The value was identified based on standard Lean fundamental and C.I. The selected value was communicated within a meeting with library managers initially, followed by deciding who needs to be involved in the improvement project within the library.

Even if the only people involved in improvement project were selected library staff, but the service is categorised as customer and process base. While the service support customer i.e. student and staff i.e. academic, none been involved and their requirements did not understood in a structured manner. Stage 8 of the model (refer to Appendix 3) indicates 'Feedback' which should be between customer, project team, initiator and sponsor. Nevertheless, the library improvement project specified the feedback stage was used between the library staff only "the feedback was more on telling the story of how the problem been managed". The reason behind that was the improvement counted as behind the scene, while stakeholders' expectation believed to be expecting the service works.

It was emphasised by the project manager that customer always right and the way to communicate with stakeholder is face-to-face, email and phone but the approach taken for improvement did not confirm the statement. Stakeholders' requirement was not investigated and none of the customers was involved in the process. The improvement believed to be behind the scene and not needed to involve other stakeholder and specifically customers. However, the assumption of customer wanting an instance access to books especially for student who are paying was taken to an account as the customer main requirements.

The improvement is considered as effective for stakeholder and mainly customer satisfaction, as by releasing £80k inventory and instant access for academic and student, the improvement assumed for sure cost effective.

4.7.3 Cataloguing books service improvement project implementation

The problem brought to the attention when the piles of books were stored in the library waiting to be catalogued. By reviewing the number of books and available staff it was realised it would take 3

months to register all the books in the system. The improvement team realised the process itself is not the problem the problem was the resource allocation, in which manager could not dedicate staff to. The action was to employ new staffs, and dedicate them to the specific process. The result of the improvement was being able to remove the backlog in a day, and remove the inventory worth £80k. The activities undertaken as part of the implementation was more behind the scene and invisible.

In pre-project and initiation stage, less than 10% of the stakeholder was involved in the improvement project, as it was considered by the project leader that the process of the service do not exceed to other area of the University.

Stakeholders	Represented Stakeholder in Pre-project & Initiation Stage
Library staff, Student, University Staff, Book Supplier	Frontline and supervisory library staff

Table 4.7 Service stakeholders vs. represented stakeholders in pre-project and initiation stage case 5

This 10% as the table 4.7 shows includes only the process-owner. The improvement on capacity plan has been in place for 4years now. The main long-term aim of the improvement was to get the books available within 24hrs for student access, but the library realised the aim had to go down to 2days because of the other process impact of the system.

4.8 Case-study 6; Coventry University, CUBIT Project

In CUBIT (Coventry University Business Improvement Training) the problem brought to the attention within BDSO (Business Development Support office) Finance group. The purchase requisition took 3 weeks, which seemed too long. The BDSO have a mixed portfolio of projects, not all of which require the same level of attention. The improvement project decided to be “to enable Principal Investigators (PI’s) to purchase for their project with minimal bureaucracy and maximum efficiency” within the BDSO. The improvement was aimed in finance group of BDSO.

4.8.1 Purchasing requisition service Improvement

The merge of post Award Project Support and Applied Research (AR) Finance and the central Finance restructure had resulted in overlapping system and processes, which added to delays to progress work and confusion for the customers. The team was unable to proactively support PI’s as time was wasted due to a lack of streamlined processes and unnecessary waste in which as a result the number of complaints has increased. Failure to address these issues did not only de-motivate a

hardworking committed team but also negatively impacted the University ability to achieve its desire in AR target.

With both Central and AR Finance process changing and a need to continue to provide a service during a period of change and increased workloads and complaints, urgent action needed to be taken to help reduce delays through duplication or unnecessary processes.

Purchase requisition, used to take 3 weeks on average to process the order and feedback, now it takes 2 days on average. The initial process map showed the process was taking them too long 3 weeks, because of the bottleneck (i.e. waiting and chasing). To do the AR project it is needed to get costing from External Funding Approval and Authorization Form (EFAF). They had classified the projects into short, medium and long project, however they realized regardless of the type of the project the steps for doing the project for all were the same.

Looking deeper into the problem it was realized the Central Finance process problems were:

- They have to return 30-40% of invoices - the most common reason was because goods have not been received, 2nd most common reason was that there is no purchase order number on the invoice
- Invoices are returned in the internal post often resulting in delays to payment (e.g. invoices get lost, are returned to wrong people etc.). Waste occurs as they are processed twice – once when they first arrive and again when they are returned with the correct information
- Applied Research for BDSO does not have a separate code, so any invoices with an AR code are returned to BDSO, regardless of the fact that the majority of these were sent directly from faculties. This means that BDSO shows a disproportionately large number of returns
- Central finance believe that staff in faculties understand the processes but chose not to use them – possibly because elements, such as gaining approval for purchases, can take too long
- The processes are included on the staff portal but are difficult to locate as they are not in an obvious place
- Purchasing processes differ between faculties
- New systems are being piloted for purchasing and staff expenses, which if working effectively, should eliminate many of these issues.

A set of questions were asked of the BDSO team to quantify the problem as well as review their satisfaction as an internal customer of the subsystem of the whole University system (Refer to Appendix 2.1).

The service itself is to serve Principle Investigator (PI) raising the order and paying the invoice. The service prior to improvement was classified by project leader as very complex as it has to involve number of stakeholders, with numbers of functionality. The service required every day.

The 6-step standard process used in improvement was the CUBIT (internal consultancy) training standard process:

1. Initiate; by identifying the problem or need in day-to-day work which prevent the staff from doing their best.
2. Map; Before a problem can be addressed a clear understanding of the current situation is required
3. Explore; through the root cause analysis and countermeasures, once a good understanding of how the process currently works is build up
4. Define; Develop the future state
5. Implement; Implementation plan in order to reach the target state (a workable implementation plan)
6. Review; Follow-up plan, as a critical step in the learning process of problem-solver is to verify whether they truly understood the current situation well enough to improve it

The specific tools and methods used within the improvement process were SIPOC to specify end to end process and everybody who were involved in, Process mapping to map the current state and highlight the bottleneck, Stakeholder analysis to understand which stakeholder hold the decision making power within the service for change and what are their input to the service.

After the training with CUBIT (internal consultant), all the participant from the BDSO became internal facilitator for their process (i.e. the process in place for helping school/faculties with aspects from identification of opportunities, through proposal development, and bid writing, to contracting, and purchasing), as the knowledge been passed to them (The aim of CUBIT was set to train problem solver within the university).

The driver behind the C.I. for the service is:

- Transferred knowledge
- Support from senior manager
- Ownership of people in department

4.8.2 Service improvement focus

The improvement project consisted of BDSO staff, senior manager (head department), team leaders and operators within BDSO. To involve the selected stakeholders within the project:

- Contacted everyone involved in BDSO (Business Development Support Office), even receptionist
- Allocated them time from day-to-day job to work on the project
- Provided external support for data collection and processing mentoring from internal consultant

The 4.5-day training provided to the key stakeholder was including:

- Current process mapping
- 5whys
- Visual control
- Work place organisation 5s
- Identify bottleneck and
- SIPOC

In the improvement project even though there was not tangible profit [cost saving] but the value was selected to be “more efficient” by bounding to inclusion of:

- A. Better supplier relation
- B. Customer i.e. staff satisfaction
- C. Standard process, across the departments

Never the less, the case study does not tell the measurement. As there was not any cost saving from the improvement, after finishing the project the value was decided to be increasing the efficiency by the project team. That was communicated to the BDSO team and senior manager, and key stakeholder at the end of the project through a presentation.

The service is categorised as Stakeholder and Process base, so CUBIT and improvement team carried out SIPOC and stakeholder analysis, and ended up with standard process. Having had carried out the stakeholder analysis, as it was explained and shown in comparing the list of who were involved in the improvement project and the list of stakeholder of the service, the analysis was purely done to understand who owns the power for making decision on implementing the change, rather than requiring all stakeholders’ expectation. The stakeholders of the service are PI (Faculties staff),

Finance department, estate, BDSO team, External supplier, and external end customer. Within this range only the key stakeholder i.e. Finance and BDSO team was involved in the project.

It was explained by project leader that as the improvement was based on key stakeholder (i.e. Finance and BDSO) their expectations understood through learning the relation between them. BDSO is a customer of Finance when they are looking for information (on has it been paid), and Finance is customer of BDSO requiring the invoice. To align the requirements of the key stakeholders, they (BDSO and Finance) decided what would be the best system to suite the department for the whole process. After the face-to-face meeting a standard process and development of a system, which was made by BDSO, was introduced to Finance. The involvement of key stakeholder (BDSO senior manager and Finance), was after mapping of current and future state was done by BDSO, and before the implementation, to get their support in implementation.

Having made the key stakeholder requirement aligned within one system, provided BDSO more power and influence on having all their required information in one screen. The single system used as a communication method for all the stakeholders.

The improvement is classified as very effective towards stakeholder satisfaction by project manager (BDSO staff), based on PI chasing is stopped.

4.8.3 Purchasing requisition improvement project implementation

The activities undertaken as part of implementation were:

- New Standard Operating Procedure(SOP)
- Carried out training
- Implemented the new invoice system

The proportion of stakeholder from the service who was involved in the pre-project and initiation stage was fewer than 10%, i.e. the process-owner only.

Stakeholders	Represented Stakeholder in Pre-project & Initiation Stage
PI, BDSO, External end-customer, external supplier, Finance department, estate	BDSO

Table 4.8 Service stakeholders vs. represented stakeholders in pre-project and initiation stage case 6

Despite the service exceeds the BDSO to Finance and academic staff within different departments of the university, as the table 4.8 shows, the improvement involved only BDSO team.

The improvement has been in place for a year now. The project started with long-term aims of:

- A. Bring the BDSO-team together from different departments, as they brought together from decentralised to centralised system, but they did not know how to work together in BDSO
- B. Focus on the process so everyone works on the same process, as start and end were the same previously but the process in between was different depending on the department. The aim was to make standardisation within the current centralized AR and Finance.
- C. Do the process more efficient, as they got less people with same amount of work to be done within the BDSO.

The aims suggested by CUBIT trainer that had been achieved based on the result of reducing the process time to 2 days. The standardised process had been developed by BDSO staff and shared with managers and in case of improvement process; A3 was used for later improvement projects for standardised process.

4.9 Case-study 7; Portsmouth University, Erasmus Project

Finance section of the Erasmus program (refer to Appendix 13), i.e. the budget holding process appeared to hold a great possibility for improvement after the informal conversation between Finance and Erasmus manager. The bottleneck in process, communication between Finance and Erasmus team, and duplication were the problems holding them back from working efficiently.

4.9.1 Erasmus service Improvement

The service provided by Finance is to provide information on processing the expense claim. The project leader explained the service itself does not hold any complexity and it is simple in terms of having few stakeholders and only one function involved. It repeats 2-3 times per year. Within the Erasmus budget holding process improvement, duplication in expenses was removed, and the process streamlined so that the authorisation of the expense can go directly to the Erasmus coordinator. The main reason that the process needed improvement was Finance got a lot of questions from Erasmus team that caused lots of delay in result. While the delays could, cause issues like exceeding the Erasmus date which would make the academic to pay themselves and miss the chance for getting fund. In addition, extra work and checking was involved, and people had no ownership.

There is not any standard process in place for all improvements, and the reason for that is mentioned as the improvement is made by Finance manager (who had been trained on Lean), whose

day-to-day responsibility is not improvement, however, there has been strong willingness to formalise the progress.

The method used for improvement was more an informal approach on trying to explain what the main problem is and what can be done to improve the process to Erasmus manager by Finance. The tool used within the improvement was mainly process mapping (Swim lane). The improvement was led by internal finance staff, and it was more case of personal interest in improving process, rather than developing in house improvement facilitator.

The improvement was based on internal staff (i.e. Finance manager). It was believed that the C.I improvement culture is not embedded in the organisation yet, and in result it is very much case of personal interest in improving things rather than effort to develop in-house improvement facilitator. Because of that the continuous improvement driver within the organisation is very much a personal, opportunist affair, although there may be reference to CI in the University's or faculty's strategy etc. but there is no structure or other evidence to actively facilitate, support or drive the CI.

4.9.2 Service improvement focus

The improvement project consisted of Administer staff in Finance and Finance Manager. As the project understood to be operational (process improvement), it was mentioned that there was no need to involve all the stakeholders. The training provided to stakeholder was on the new system, to explain the new process in an email to all potential participants in the exchange programme, and one to one explanation to the faculty exchange coordinator.

The selected value for the project was 'Time' because other process within finance could have been done by creating the capacity available. The way value was selected is specified happened to be 'time' as the aim was to remove waste in the process.

The value was communicated post new system development (i.e. before implementation), to introduce the solution to the stakeholder. By booking IT a PC room and invited people who were involved i.e. Finance staff and Erasmus staff, to show them how the new system works for 2hours.

The service is categorised to be 'Customer', 'Stakeholder' and 'strategy' base as the process understood to be only a tool to deliver the service. While strategy is there to safe guard the assets and providing information, and what service delivers is done for customer and stakeholder. 'Therefore, it is required to keep everybody happy by keeping the interest of the university in mind'.

The service support specifically Academic and funding body, when having a broad range of stakeholders:

- Budget holder
- Director of Finance
- Academic
- Erasmus

For understanding the stakeholders requirement, two method was explained;- one to put yourself in customer position and used your own way of judgment, and the other to review the process with key stakeholder (in this case Erasmus coordinator) to narrow down the process. Even though, there is no standard process in place for balancing the requirements from the stakeholders but it was mentioned depending on the situation and time, the requirements might change and not be aligned to each other. For instance currently there is an emphasis on externally generate revenue, and based on that all the departments try to put as much as they can in report. The provided example shows the requirements are balance and delivered based on the power of stakeholder, i.e. the stakeholder with the higher authority at the university. It is believed that the change of expectation should be dealt as an internal drive, and a way to review whether the service is in place is still required.

Even if the stakeholders' requirements are not captured and not involved at the outset of the project, but Finance manager believed that the stakeholder need to be involved before implementation to be introduced to the development made to the service. This is dependent on the type of improvement i.e. if the improvement is behind the scene and only the sequence of process changed and not the main service there is no need to involve them, but if the service changed it is required to involve them to introduce the new system and how it works.

The improvement of Erasmus service is specified as very effective in case of stakeholder satisfaction, even though there is no measure in place to back this up. But the statement is based on understanding that if there is any issue it will be raised in the monthly meeting in form of feedback from budget holder, Finance team, and Erasmus team. This is while by improvement of the budgetary control the service expects to meet the customer requirement better as well.

4.9.3 Erasmus project improvement implementation

The activities had been undertaken as part of the implementation, were:

- Document all the process
- Communicate with everybody why it changed, and what has been improved in the new system, and where to find the documents

The proportion of stakeholders who were involved in the pre-project and initiation stage was less than 10% (i.e. process owner) and they were majority administrator as it shown in table 4.9.

Stakeholders	Represented Stakeholder in Pre-project & Initiation Stage
Erasmus, Finance, Budget holder (funding body), Academic, Potential participant	Finance and Erasmus

Table 4.9 Service stakeholders vs. represented stakeholders in pre-project and initiation stage case 7

The reviewed process itself did not exceed the area of the service to any part of the university, and it was very limited to the people adopted the improvement. As it was looked at locally and in isolation only between Finance and Erasmus, rather than in holistic end-to-end process review of the service.

The improvement has been in place for 2 months, with a long-term aim of working time efficient and removing any extra non-required activities within the process.

4.10 Case-study 8; Portsmouth University, Referrals Project improvement

Referral Process (Refer to Appendix 14) in Graduate centre raised to attention that requires improvement. The process took resource and time to be done as it was manual and inflexible. After putting long time on finishing the process, there was always either something wrong or something needed to be changed, which the inflexible system didn't have the characteristics to respond quickly to the change. Therefore the long resource consuming process must have been done again. That was when the team thought, "How can we do it better?"

4.10.1 Referral service Improvement

Referral service is the service provided to student and academic and it is mainly on right timing, planning student, invigilator and rooms. The service indicated by the project leader that had high

level of complexity before the improvement as there were number of stakeholders with number of functionality involved. It is mentioned that by customizing the options and allocating basic process in place and deal with the exceptions individually, the service moved to simple with few complex step categorisations, i.e. by reducing number of process in place for process owner and back-office staff. The service only occurs once a year.

It had been brought to attention that the service requires improvement based on its inflexibility to change, and time and resource consuming process. The process improved by Rapid Improvement Workshop (RIW) to streamline the process. The tools used in improvement were mainly process mapping (Swim lane), done by an internal staff (however the project manager was external to the process). While the organisation has not planned for developing any in-house facilitators, and the C.I. concept has not been supported in structured way yet. In result, the operational CI is very much a personal, opportunist affair, although there is reference to CI in the University or faculty's strategy.

4.10.2 Service improvement focus

The project consisted of administrator in graduate centre and selected academic, and as the improvement understood to be operational (process improvement) the project team did not give any consideration for stakeholder involvement. No training had been provided the stakeholder rather than distribution of training document of the new process between the participants within the improvement project.

The selected value for the project was 'Time', and 'Accuracy' to make the process more reliable and create capacity to add value in other area. The project team decided the value, based on the need for removing waste, and the value happens to be time. The value was communicated with stakeholder by sending email out to all the stakeholder indicating the change happened. In addition, the designed standard process was allocated on data based system with giving access only to the project team, and in case someone outside of the team had question regarding the process would be referred to the project team.

The service is categorised as 'customer' and 'strategy' based, and the process understood to be only a tool to deliver the service. The Finance manager believed "while the service needs to be delivered correctly for the interest of customer, the interest of university is kept in mind". The service support Students, academic and staff. To understand the stakeholder expectation academic were involved in RIW. Not much alignment of requirement was investigated, as the service university is offering to student on referral is traditionally done by written exam, and all the university can do is to keep the exam within the expected standard to make sure the students do their exam well. Therefore, the

Students requirements will only be acceptable to the level that it can be fit in the expected standard from Exam board (i.e. the policy in place), for instance the H&S within the room. The highlighted point on exam showed the standards in place from the educational authority, one of the stakeholders of the service, are understood as a requirement to be taken to an account. Even if not all the stakeholder expectation had been elicited and balanced for improvement in the project, but the raised issue such as inflexibility in process has been taken as a way to question the current service on whether it is still required by customer.

The communication with the stakeholder as it was explained by the project leader, is post development and improvement, and it is dependent on type of the improvement, i.e. if it is behind the scene and only on changing the sequence of activities there will be no need to involve the wider range of stakeholder, but if the main service changes, it is required to introduce the new system.

The service improvement is classified as very effective in stakeholder satisfaction, even though there is not a process in place to measure satisfaction, but it is believed if they face any problem they will contact the project improvement team. Meanwhile, the improvement expected to deliver the customer expectation better as well.

4.10.3 Referrals service improvement project implementation

The activities had been undertaken as parts of the implementation were:

- Documenting what happens each stage
- RIW on Swim lanes, Process mapping
- Academic did the process map; with the aim of guiding the process mapping (use of tool) and streamline the process

The proportion of stakeholders who were involved in the pre-project and initiation stage was in the range of 10% to 50 %, indicating the involvement of process owner and back-office staff. The reviewed process itself was very limited to the people adopted the improvement in Graduate Centre.

Stakeholders	Represented Stakeholder in Pre-project & Initiation Stage
Graduate centre, Academic, Student, Educational authority (across the Faculties)	Graduate centre, Educational authority, Academic

Table 4.10 Service stakeholders vs. represented stakeholders in pre-project and initiation stage case 8

The improvement had been in place for 1.5 years now. The long-term aim of the project had been set to free up resources and deliver better quality and better service to students, however there has not been a process to measure satisfaction rather than the allowance for stakeholder to raise their problem with project improvement team after the implementation.

4.11 Case-study 9; Cardiff University, HR Project

The staffs recruiting process was taking 4-6 months to complete and as the academic was not very interested in putting time for communicating on what exactly they were looking for, and in result, the HR was not getting the right required information to act on. The service supports staff and in general anyone who is hiring within the university.

4.11.1 HR Service Improvement

One of the services provide by the HR at Cardiff is facilitating the recruitment of new staff (Refer to Appendix 15). The service was paper based for the start, which then was transferred to a file in the system and moved to computer-based system. The service itself is simple in case of level of complexity, and occurs once per application. It is selected as simple by improvement leader as it explained the service has few stakeholders and only one function involved. The HR recruitment improvement project was a “Strategy alignment” project to define process and activities of the recruitment with tangible benefit of speeding the recruitment of staff. The process of recruiting new staff was time consuming (4-6 months) therefore, the academic venture needed improvement. The focus was to get the right information to the system while the system was being improved.

The standard process in place for all the improvement are developing current, and future state map, while providing training and setting KPI to run for the process. In case of HR project, after future state was defined further project within the main project was set in place.

The method and approach used for the improvement was strategy deployment and value stream mapping. Backing up the approach the tools used was Hoshin Kanari, and Big picture (value-stream mapping), however the project mentioned not to be too tool based and more strategy and workshop base. The project ran by internal Lean improvement consultant team, aiming to develop in-house improvement facilitator in each area the projects run.

The driver for C.I. for the university is highlighted as the team of 4 people who their main role in the university is to work on improvement projects.

4.11.2 Service improvement focus

The improvement project consisted of mostly HR staff (quite senior and middle manager), and academic (from departments). The strategy to involve the selected stakeholder within the project was following the workshop with senior manager the area to improve was selected from the point specified by them, and then teamwork. No training was provided to HR staff in the project, and the Lean improvement team facilitated the mapping process for them. However, this got change later in next projects as the Lean team didn't want to be involved in all improvement projects, therefore they trained an internal team in order to pass out knowledge and making them able to work on further improvement.

Despite of other case-studies the project specified by internal Lean consultant as Muri (overburden) based rather than Muda (waste base) and in result the value hasn't been specified and this has been decided on following down the university issues which showed the frustration for both academic and HR staff. As the HR wasn't getting the right information despite of time and effort the academic after 4-6 months still was not getting what they wanted, the frustration were from both parties. The decision on Muri concept was communication to senior manager in HR with running a session.

The service is categorised as 'customer' base because it is believed, required providing the customer a better service. The service supports staff and in general anyone who is hiring within the university. To understand the stakeholder requirements report of complaints from HR-staff was reviewed. All the requirements from the staff were aligned and it was generalised spread perception.

Even though, not all the stakeholder expectations were captured for the improvement, but couple of departments academic were involved on early stage of diagnostic to map the process in details. When the program rolled out the stakeholder got informed about the changes and improvement.

The improvement is classified as very effective towards the stakeholder satisfaction, based on measuring the beforehand average time taken and after improvement, the time taken 4-6 months reduced to 2-3 months. In which taken as a way to clarify the customer requirement been meet better as well.

4.11.3 HR service improvement project implementation

Within the implementation phase, the main focus was to get the right information to the system while improving the service. Fewer than 10% of stakeholders were involved in pre-project and initiation stage, however the change affected everyone i.e. the service exceeded to other part of the University, as it is listed in table 4.11.

Stakeholders	Represented Stakeholder in Pre-project & Initiation Stage
HR staff, Academic, anyone who is hiring with the University	HR senior staff and Academic

Table 4.11 Service stakeholders vs. represented stakeholders in pre-project and initiation stage case 9

The improvement was done by a software template to specify the mandatory field to be filled by the academic, to improve the communication between HR and academic. The improvement had been in place for 5 years now since the implementation. The long-term aim of the project mentioned was to recruit staff within 2-3 months by reducing the inefficiency, and removing waste. However in analysis side they are not measuring the delivery of the set aim, nor how well it fits in the other area of the University.

4.12 Case-study 10; Leicester University, Maintenance project

The maintenance process (maintaining the University owned buildings) realised by managers that is not reliable anymore and seems the whole system in that area is broken and needed improvement. The response time was not reasonable at all, 45 days on average. The system had joint of problems from how people report, to how well the reported issues get solved, as well as the response time.

4.12.1 Maintenance service improvement

The main service provided is maintaining the university owned buildings. The service rates as very complex prior to improvement. It is indicated by internal improvement manager that the service was very complex as there are number of stakeholders with number of functionality involved. The internal improvement manager explained further that the complexity is moved to simple by reducing number of process and using FIFO. The frequency of service is all the time every day, sometime even outside of standard working hours.

The improvement was made by “system thinking”, with a team containing external consultant from Vanguard, internal staff development, as well as maintenance team and stakeholders from hall of residence. The system required improvement after the managers realised the whole system needed improvement and was broken.

The proposed standard process in place for all the improvement is Vanguard standard, system thinking. The project is in the first section of the model ‘Check’. Within this stage as part of the methodology was to understand the customer point of view with aim of maintaining the buildings and service.

The point of contact of service with customer was the start point, moving to look at demand based on available holding data. The output of analysing data showed the average meantime of service is 15 days and as it went along the service was getting worse. 25’000 of complaints from customers was analysed to find out how often and on what the complaint were made. Based on Vanguard methodology the demand was divided to two sections:

- Value Demand; e.g. the customer call on saying my toilet is blocked
- Failure demand; e.g. the customer call to say I have told you my toilet is blocked but still haven’t got service from you to fix it.

Following to categorising the demand, capability chart was made, to find out the impact of waste on the customer. Analysing the system, an excel sheet was developed to record the demand based on FIFO.

The decided value steps for the service are:

- Access to the fault
- Able to diagnose it first time
- Fix it

The required skills and information for delivering the value steps were worked out by the improvement team, which the most driving one was ‘faculties get serve base on FIFO on the recorded report’. The board used in the office to show the FIFO flow, where the excel sheet was used at the same time.

As the project was more data driven and was about what customer wants, the specific tool used in the project was capability chart, and the rest of the project was about having ‘system thinking’ mind-set. Even though the improvement were done by mix of external and internal consultant, but the

aim evolved more on managing and passing the knowledge rather than developing in house consultant.

4.12.2 Service improvement focus

In addition to the consultants, the improvement project team was made of mostly up-face staffs because in 'check' step of the project people who actually do the work need to be involved such as electrician, and development staff, as well as the deputy director of residency. The strategy used for involving the selected stakeholder within the project was pull system, i.e. senior manager thought the system is broken and require improvement, followed by senior manager with required skilled chosen, and between them the one liked to be in the project joined. The improvement team learned as they did the project, however there was training in place for senior managers and operational managers on 'system thinking (management development program)'.

The value specified for the service was to make the service better, as the cleaner (i.e. less waste) the system the bigger can be the saving. This has been decided based on the knowledge with the aim of making a bigger value for the business. The communication was mainly about the mind-set and 'system thinking' with operational managers, rather than value.

The service is categorised as 'customer' based, as 'system thinking' is all about customer point of view. The service supports customer i.e. students, and staffs as the main stakeholder. The communication channel in place for the customer is helpdesk (refer to Appendix 16).

The requirement of the main stakeholders i.e. customers, is understood by doing 'check' phase of the model and dividing 'value demand' and 'failure demand', as well as asking departments who were involved in the system about the customer interaction point. The expectation of customer as the main stakeholder is believed to be aligned, as what matters for them is the issue to be solved as quickly as possible. Having a clear understanding of customer demand made the people own the process, and increase the team empowerment, while the manager understand the need for understanding the system.

Even through key stakeholders were involved to understand the customer value and failure demand from the service but not all the stakeholder requirements was captured.

The service is rated as very effective in customer satisfaction, based on one of the building feedback as well as the measure in place to gather data on 'access to the fault', '% first-time fix' and tracking the spare part arrival on time by using Kanban, for next step of improvement (i.e. plan; what perfect

is and put in experiment). The improvement in result believes to enable the area to meet customer requirement better.

4.12.3 Maintenance service improvement project implementation

The implementation of the Vanguard model on 'check' steps was:

- Purpose of the system; what matters to the customer,
- Demand; the frequency of the demand
- Capability; from existing measure to find out how well the service is fulfilling the demand
- Flow; what actually happening and how the demand is getting passed within the system
- System condition
- Management of thinking; to understand why the change is carried forward (double loop)

Only 10% of the staffs i.e. process owner (up-face maintenance, and electrician) were involved in the pre-project and initiation, however as the project rolled out it improved to the range of 10% to 50% i.e. process owner and back-office staff (up-face maintenance, electrician and DD residency). This is while the service exceed to the whole university.

Stakeholders	Represented Stakeholder in Pre-project & Initiation Stage
Maintenance team, hall of residence, faculties staff, student, parts supplier	Maintenance team (Up-face maintenance staff, electrician, development staff), DD of residency

Table 4.12 Service stakeholders vs. represented stakeholders in pre-project and initiation stage case 10

The 'check' phase of the project had been in place since 5th of December 2011, nevertheless, it is mentioned that the improvement is a C.I. based on Vanguard methodology. The project is planned to go through further steps of;

- Plan; what perfect is and you put it in experiment
- Do; make it normal and roll the people in

The long-term aim of the improvement is achieving the perfection, which is a C.I. and is in progress, by making the experiment successful and normal. C.I believed to be part of the "system thinking" and based on Deming model it needs to be an ongoing.

4.13 Summary

In-depth structured interviews on 10 improvement projects within five universities of:

- Cardiff university
- St Andrews University
- Portsmouth University
- Leicester University
- Coventry University

The case studies described the reason for improvement, the focus and value realisation within the improvement project, and the implementation process. Going through the specified areas, described in details the level of stakeholders involvement either throughout the project or within certain points, while capturing information on whether the value has been based on balanced stakeholders expectations or any other approach.

As shown in table 4.13 the service complexity classification against the improvement stakeholder involvement demonstrated that:

Case-study	Service complexity classification	involved Stakeholder in developing the solution
Case 1	Simple; few stakeholder, only one function involved	Process owner
Case 2	Very complex; number of stakeholders, with number of functionality involved	Process owner
Case 3	Simple with few complex step; few stakeholders, with number of functions involved	Process owner and back-office staff
Case 4	Simple; few stakeholder, only one function involved	Process owner
Case 5	Simple; few stakeholder, only one function involved	Process owner
Case 6	Very complex; number of stakeholders, with number of functionality involved	Process owner
Case 7	Simple; few stakeholder, only one function involved	Process owner
Case 8	Very complex; number of stakeholders, with number of functionality involved	Process owner and back-office staff
Case 9	Simple; few stakeholder, only one function involved	Process owner
Case 10	Very complex; number of stakeholders, with number of functionality involved	Process owner

Table 4.13 Service complexity classification vs. involved stakeholder

In cases 2, 8 and 10 – projects in which significant complexity was presented – the project improvement leaders indicated the service has been moved from very complex to simple; not by managing all the stakeholders expectations, but by streamlining the process and increasing the efficiency for only those stakeholder who were presented in the improvement, rather than seeking to deliver an improved service across the full range of stakeholders.

Chapter 5 will further analyse the case studies introduced here to evaluate the research problem mentioned on chapter 2; the need “To provide a means of identifying and prioritising stakeholder requirements at the outset of an improvement project, such that the resulting the resulting outcomes provides a ‘better fit’ solution for all stakeholders’ in details.

Data Analysis

5.1 Introduction

In previous chapter the 10 case studies on improvement made in HE service was demonstrated. The data analysis chapter builds up an analysis and discussion based on all of the case studies (table 5.1) developed in chapter 4, with the aim of investigating ‘How the value is assessed and agreed within the HE Service, specifically when an improvement is made’. With a specific focus on whether the stakeholder definition of value is incorporated into project.

The improvements were carried out within different areas providing services at each of the universities.

		Improvement Projects							
Universities		Library	SAB/PAB	Payroll BDSO	Maintenance	Finance BDSO	Erasmus	Referral GC	HR
1	Coventry	✓	✓	✓		✓			
2	St Andrews	✓			✓				
3	Portsmouth						✓	✓	
4	Cardiff								✓
5	Leicester				✓				

Table 5.1 The improvement projects at universities

The five case study organisation (Cardiff, St Andrews, Leicester, Portsmouth, Coventry University) selected represent the qualitative sampling of Lean improvement within the HE service, in which the analysis was made around the same diagnostic questions (refer to table 2.18) used for reviewing the Lean improvement models in chapter 2.

5.2 Case studies Analysis

All of the improvements reviewed are project-based (Table 5.2), regardless of whether the institution approach is based on creating problem solvers across the university i.e. a strategic improvement level or delivered through the use of RIE's within the operational improvement level only. The strategic level the aim is to involve everyone in training and understanding Lean thinking while making them a problem solver, like CS4 (St Andrews) and CS6 (Coventry), whereas at an operational level improvement, the improvement is to find a solution for removing the stated problem. In both cases the improvement is on process but the base of starting, the improvement is different.

Case Study	Improvement	Strategic level	Operational level	Project base
CS1	3days RIE External consultant		Operational	✓
CS2	1year project External consultant		Operational	✓
CS3	RIE Internal consultant	Strategic		✓
CS4	RIE Internal consultant	strategic		✓
CS5	RIE Internal consultant	strategic		✓
CS6	RIE Internal consultant	strategic		✓
CS7	Internal consultant		Operational	✓
CS8	RIE Internal consultant		Operational	✓
CS9	RIE Internal consultant		Operational	✓
CS10	Project in progress External consultant	strategic		✓

Table 5.2 The project base improvements

Each of these improvement projects was raised to the attention of senior managers as an area requiring improvement for different reasons and different aims set against each to be achieved. Table 5.3 shows the range of provided service and complexity level of the services studied. The complexity of the service is related to the functional boundaries and multiple stakeholders involved. The greater the number of functional boundaries involved in the delivery of service and the number of stakeholders involved, the greater the complexity recorded.

Case-study	Service complexity classification	involved Stakeholder in developing the solution	Improvement level
Case 1	Simple; few stakeholder, only one function involved	Process owner (Library shelving staff)	The improved process did not respond to the change
Case 2	Very complex; number of stakeholders, with number of functionality involved	Process owner (Registry Admin staff)	Efficiency
Case 3	Simple with few complex step; few stakeholders, with number of functions involved	Process owner and back-office staff (BDSO assistant accountant and HR manager)	Waste elimination
Case 4	Simple; few stakeholder, only one function involved	Process owner (Frontline supervisory and senior estate staff)	Efficiency
Case 5	Simple; few stakeholder, only one function involved	Process owner (frontline and supervisory library staff)	Efficiency
Case 6	Very complex; number of stakeholders, with number of functionality involved	Process owner (BDSO)	Efficiency
Case 7	Simple; few stakeholder, only one function involved	Process owner (Finance)	Efficiency
Case 8	Very complex; number of stakeholders, with number of functionality involved	Process owner and back-office staff (Graduate centre, Academic, Educational authority)	Waste elimination
Case 9	Simple; few stakeholder, only one function involved	Process owner (HR senior staff and academic)	Efficiency
Case 10	Very complex; number of stakeholders, with number of functionality involved	Process owner (Maintenance team, development team, and DD of residency)	Efficiency and elimination of waste

Table 5.3 Service complexity classification, involved stakeholder and improvement level

In case 2, 8 and 10 the complexity is indicated to decrease to simple level after improvement, however the level of stakeholder involvement in development of solution demonstrates in all cases the simplification of the process is solely for process owner rather than all the service stakeholder. Except case 1, that the improved process did not deliver the aim, the rest of cases demonstrated improvement in removing inefficiency and elimination of waste. However, even in demonstrated level of improvement, the limited involved stakeholder reveal the improvement of efficiency is process-based rather than service-based i.e. holistic approach. All the cases indicated they have achieved effectiveness in their improvement, whereas there were not any measures in place to back up their claim.

	Case-study	Service	Complexity level	Reason identified for improvement	Measure of problem and metric	The improvement been in place for
CS1	Coventry Library	Return books to shelve	Simple	Take too long to shelve back	Increased number of trolleys to be served	1year
CS2	Coventry SAB/PAB	Approving the marks and Determining the progress or award	Very complex	Inflexibility of system consumed staffs time equal to £100k	Time and cost (Full time staff, £)	6months
CS3	Coventry payroll BDSO	Secure and deliver externally funded activities	Simple with few complex steps	Inconsistency in getting payroll data	Waiting time	9months
CS4	St Andrews Maintenance	Maintenance of university owned buildings	Simple	Change from reactive to proactive	Long process (44 days/job)	18months
CS5	St Andrews Library	Provide student access to the books	Simple	Student access to the new books	Actual light blockage to the library	4years
CS6	Coventry Finance BDSO	Raising order and paying the invoice	Very complex	Took too long (3weeks)	Increased workload and complaints	1year
CS7	Portsmouth Erasmus	Processing expense claim	simple	Delays in the process	Missing chance for getting fund, and uncertainty of Finance	2months
CS8	Portsmouth Referrals	Planning student, invigilator and rooms	Very complex	Time and resource consuming & inflexibility to change	Long-time process and long-time to change	1.5years
CS9	Cardiff HR	Facilitating recruitment of new staff	Simple	Process was time consuming	Long-time process (4-6 months)	5years
CS10	Leicester Maintenance	Maintenance of university owned buildings	Very complex	Response time not reasonable (45 days in average)	25000 customer complaints	8months

Table 5.4 Overview of the improvement projects

The studied cases cover different areas of the university providing service, which in result should show a range of stakeholders. The services been categorised within range of simple to very complex, as the complexity of the service increases the number of stakeholder increases too, and in result the number of expectations. The complexity level in table 5.4, reflects the answers that was provided in the interviews, which fall under 3 main categories of;

- Very Complex; numbers of stakeholders with number of functionality involved
- Simple with few complex step; Few stakeholder, number of functions involved
- Simple; Few stakeholder, only one function involved

Therefore, the cases can provide appropriate platform to evaluate the research problem, restated here for clarity, “in order for an improvement project to be perceived as successful from a stakeholder perspective their requirements would need to be understood at the outset of the improvement project and that where complexity includes multiple stakeholders, with a number of objectives, these would need to be identified and prioritised. In order to provide consistent results and sustained improvement, this action should be an explicit part of the improvement methodology utilised”.

As Bicheno (2012) described, the level of improvement can differ from resolving inefficiencies, to removing waste, with the ultimate aim of improving whole system. Improving the whole system should result an effective service. Comparing the reason for improvement and the measure in place for problem in table 5.4 and 5.5, shows the improvements mainly fall into the first two categories, i.e. resolving inefficiency and removing waste. To clarify this further the comparison between set long-term aim, Value, and solution was studied:

	Problem	Long-term aim	identified Value	Solution
CS1 Coventry Library	Decreased number of resource	Return books in shelves within 24hrs period	time	Employ more resource
CS2 Coventry SAB/PAB	Process is time and resource consuming	Reduce time and mistakes and negative student experience	Reduce student complain through error reduction	Automated system
CS3 Coventry BDSO Payroll	No consistency	Have data available for everyone faster	time	Automated system
CS4 St Andrews Maintenance	Long process	Proactive and more efficient maintenance team	Free-up trade men time, cost effective	Electronic system
CS5 St Andrews Library	Blockage of light, book access	Provide access within 24hrs	Access to stock worth £80'000	Employ new staff

CS6 Coventry BDSO Finance	Centralisation, decreased number of resource	Managing workload with less resource efficiently	Increasing efficiency	Centralized system to suit all the departments
CS7 Portsmouth Erasmus	Delay caused by Finance on asking Question from Erasmus	Remove waste, be time efficient	Time	Remove duplication, authorised expense directly goes to Erasmus
CS8 Portsmouth Referrals	Time and resource consuming process	Free-up resource & deliver better quality service to customer	Time and accuracy	Streamline the room booking process to create capacity
CS9 Cardiff HR	Academic and HR staff frustration	Reducing inefficiency & remove waste (recruit within 2-3 month)	No value Muri base	Software template (mandatory fields)
CS10 Leicester Maintenance	Long response time	Achieving perfection C.I.	Better service	Excel sheet to record demand based on FIFO

Table 5.5 improvement level clarification

The specified problems, which are the main reason for improvement project, can be classified to two main categories;- one as reduced number of resource and the expectation of working more with less (CS1, CS5, CS6), and the second one the inefficiency and waste within process (CS2, CS3, CS4, CS7, CS8, CS9,CS10). In case 1 and 5 despite the aim of using Lean for enabling them to manage the service with decreased number of resource, the solution was to employ more resource.

While efficiency according to Thesaurus dictionary means “accomplishment of or ability to accomplish a job with a minimum expenditure of time and effort” i.e. it only maximise the use of all resources in the delivery of high quality service, the effectiveness means “adequate to accomplish a purpose; producing the intended or expected result”, i.e. ensures all business processes meet existing and emerging needs. Existing and emerging needs are hold by stakeholders of the service, therefore in order the project to be perceived successful and effective from a stakeholder perspective, their requirements would need to be understood at the outset of the improvement project. To evaluate that, the cases were studies against the diagnostic questions.

5.2.1 Representation of All Stakeholder

To understand whether all the stakeholders have been represented at outset of the improvement project or not, the list of stakeholders and represented stakeholder within the project are compared against:

- Have All the stakeholders been represented at the outset of the improvement project?

	Presence stakeholders	Represented stakeholder
CS1	Student, Library staff, University staff	End service provider library staff
CS2	Exam Board, Admin Registry, Lecturer, Program manager and Student (Across Faculties)	Admin Registry
CS3	BDSO, HR, Senior management, Funders, PI(academics), Finance	Selected BDSO, HR manager, Finance
CS4	Estate technical and administrative team, Academic, Student, Supplier	Frontline, supervisory and senior estate staff
CS5	Library staff, student, university staff, supplier	Frontline, supervisory, senior library staff
CS6	PI (Faculties staff), BDSO finance, external end customer, external Supplier, Finance department, estate	BDSO finance, Finance department
CS7	Erasmus, Finance, Budget holder(funding body), Academic, potential participant	Finance, Erasmus, Faculty exchange coordinator, potential participant
CS8	Graduate centre, Academic, student, educational authority (Across Faculties)	Graduate centre, academic, educational authority std
CS9	HR Staff, Academic, anyone who is hiring within university	HR staff, Academic
CS10	Maintenance team, hall of residence, faculties staff, student, parts supplier	Maintenance team (Up-face maintenance staff, electrician, development staff), DD of residency

Table 5.6 Stakeholder vs. represented stakeholder

While it is evident that not all the stakeholders have been represented in the projects, further analysis was undertaken to understand whether they were represented at start of the project or not. Their involvement in project timeline is therefore captured:

	Pre-project	Initiation stage	Delivery stage
CS1	Project team; end service provider library staff, External consultant	Project team	Whole library staff was briefed by project team
CS2	Project team; Admin staff IT, Business analyst	Project team	Faculties, Department, project team

CS3	Project team; BDSO (assistant accountant, project manager)	Project team, HR manager, IT	Finance, BDSO team, Project team
CS4	Project team; Frontline, supervisory, and senior estate staff, internal consultant	Project team	Project team
CS5	Project team; Frontline, supervisory staff, internal consultant	Project team	Senior library, project team
CS6	Project team; BDSO, Internal consultant	Project team	BDSO Senior manager, Finance, Project team
CS7	Project team: Finance	Project Team, Erasmus	Potential participants in exchange programme, Faculty exchange coordinator
CS8	Project team; Graduate centre, educational authority, Academic, internal improvement team	Project team	Project team
CS9	Project team; HR, Academic, internal consultant	Project team	Project team, anyone who is hiring within university
CS10	Project team; external consultant, development staff, maintenance staff and DD of Hall of residence	Project team	Project team

Table 5.7 Represented stakeholder within project timeline

Further analysis was undertaken to establish why only some of the stakeholders were involved and why only at certain stage of the project.

The reasons provided in CS1 for not involving all the stakeholders is , ‘as they need different things and developing system that reply to extreme demand is demanding and costly and the core aim of the business is to balance the budget and resource with the approved needs.’ Not having the capability to manage the stakeholder expectation in a structured manner, made the improvement to dismiss the involvement and only involved end service provider to develop the solution, while only briefed the library staff on overall aim of the improvement in delivery stage.

In CS2, even though the service is classified as very complex and the consumed calculated time included the admin staff, academic staff and external academic staff, but only admin team who had the responsibility to manage the produced paper base documents were involved. The training manual, online video for faculties and separate training for academic as well as review documents for how to use the 'new system' was developed, to introduce 'the solution' in delivery stage. The reason provided for not involving all the stakeholders, was that as the improvement was 'behind the scene' the stakeholder were not directly involved but their area of concern were looked at.

In CS3, the pre-project stage started with BDSO assistant accountant and BDSO project manager. After the solution was developed by the project team, the HR manager was communicated with to get the required data so that the second phase of improvement i.e. the automation of the system could be developed by IT. Only after the development of the solution was the new system shared by Finance, BDSO team, and management team. The remaining of the stakeholders were left out. The reason provided was that the improvement was 'behind the scene' (internal to process owner), and the other stakeholder needed only to see the result, which has conquered a faster outcome.

In case of CS4, the proposed model from St Andrews shows involvement of certain stakeholders e.g. the customer (one of the stakeholders), at certain point of the project. However, in the reviewed project the comparison in table 5.6 and 5.7 showed not all the stakeholders are involved and the customers are not involved either (only process owner were involved). Although the service is provided across the university, it was reasoned that the process does not extend to any other area of the university, and therefore other stakeholders did not require to be involved.

In CS5, stage 8 of St Andrews model used as standard process for improvement indicating 'feedback'. Despite the expectation that this can cover feedback to the stakeholders, it was specified that 'the feedback was carried out between the library staff only and 'was more on telling the story of how the problem had been managed', i.e. communicating the solution. The reason provided was that the improvement is behind the scene (invisible) and therefore there was no need to involve stakeholder, or specifically customers.

Within CS6, the solution was a single system used as a communication method for all the stakeholders. While not all of the stakeholder were represented at the outset of the project. The service exceeds the boundaries of BDSO to Finance, Faculties (lecturing staff), estate, external customer and external supplier i.e. wider range of the functionality is involved.

CS7, the improvement project included the finance team (administer and manager), and an informal conversation was carried with the Erasmus manager about the problem and how it might be solved.

After the solution was implemented, the new system was communicated through email with potential participants in exchange programme and faculty exchange coordinator, as well as 2 hours of live training at the point of implementing the system, as the system needed to be used by stakeholder. This is reasoned as if the improvement classified as behind the scene improvement, and only the sequence of process changed there is no need for involvement of stakeholder, whereas if the service changes it is required to introduce the new system to the stakeholder. The explanation clarifies the involvement of all stakeholder does not understood to be required, rather than at the point in time, when stakeholders' support and buy into using the new system in implementation stage turns to be necessary.

CS8, despite other case studies, had to consider the educational authority standard from the start of the project, and involved academic to do the current state map of the process. Never the less the designed standard process was given access only to project team.

CS9, has involved Academic and HR from the start when it missed involvement of an important stakeholder, i.e. business side of the university who recruits through HR.

CS10, the represented stakeholder range shows the involvement of all however, the students were not involved directly.

The common mentioned points for not involving all the stakeholders were:

- The change was 'behind the scene'; this is mentioned when the description of stakeholder means they have interest or get affected by the service, therefore behind the scene doesn't exist. It can only be a way for reducing the complexity of managing range of expectations in result of not having a structured method in place.
- The process of service does not exceed to any other area of the university; this is mentioned while the service is provided to the whole university. And in result looking at process isolated from upstream and downstream, and other stakeholder who are involved.
- Representation of greater number of stakeholder in implementation phase; the obvious reason can be the stakeholder supports the requirement for implementing the new system.

5.2.2 Eliciting the stakeholders' requirements

In the previous section both CS8 and CS9, represented the wider range of stakeholder at the outset of the project. It will be discussed in this section whether the involvement was based on capturing their requirements or not. In other cases, it was mentioned that even if the stakeholders were not involved at outset of the project their area of concern was looked at. To understand the formal process used to capture and determine stakeholder requirement the 10 cases were further studied using the following approach:

- Has a formal process to capture & determine all stakeholders' requirement been used?
 - Yes, a formal process has been established for identifying standard value expectation
 - Partially, structured process for defining value is applied only to selected/key stakeholder, by defining requirement internally and based on past experience
 - No, means of defining the value from stakeholders' requirement is informal and unstructured

	Yes	Partially	No
CS1		X	
CS2		X	
CS3			X
CS4			X
CS5		X	
CS6			X
CS7			X
CS8			X
CS9		X	
CS10		X	

Table 5.8 Formal process to capture all stakeholder requirements

In CS1, the CTS tree is used to list VOC, but the list was made not with the customer involvement but based on the project teams past experience. The logic behind this was that 'what customers are interested in is the output, regardless of how it is achieved.' This is mentioned when, within the system, the communication channel is in place for customers to report issues, as general feedback, i.e. the requirement are captured in a general, and unstructured manner and only when the system fails on delivering what had been identified as the stakeholder requirement. The involvement of

other stakeholders, based on the implementation plan, is only after the design of solution and development plan, when they are introduced to the new system.

In CS2, Admin Registry was involved at the outset of the project and their expectation was captured, resulted in the solution being a paperless system. The student feedback was reviewed through the communication channel in place for reporting issues such as a reception query, directly to admin support. However, by reasoning the change to be a 'behind the scene' one and not affecting the stakeholder, the developed solution, by business analyst, was communicated to the stakeholder for implementation.

The SAB/PAB system is used by the Exam Board for quality assurance and academic decisions to be made, and for lecturer/program manager to check the accuracy of module marks, distribution, % of fails and % of distribution in order to decide whether to recommend changes. Therefore, a graphical demonstration of the data would seem important to be a design within the new system. Surprisingly, on further investigation it was realised that graphical demonstration wasn't included in the solution and as the project had been running for two years and already agreed and implemented the raised requirements from academic while an acknowledge requirement was not actioned.

In CS3, the means of capturing and understanding requirement within the project is informal and unstructured. As mentioned, the understanding of the requirements from stakeholders were through the project team past experience (from Funders), income target (from Senior Management), and informal feedback (PI's). In the case of HR involvement, it was only on clarification of the process and asking them to upload the data so that the team was able to develop the second phase of improvement with IT, and not to specifically capture their requirements.

In CS4, from the start it is assumed all the stakeholder have a fix requirement; they 'want things to work' therefore no means of capturing and understanding the requirements within the project was used. The statement is made that the customer i.e. student, always win in getting what they require from the service. However, the case established they do not elicit the customers' requirement. Therefore, the statement might be better to be changed to 'the customer always wins in getting what process owner think they require from the service'.

In CS5, within RIW the requirement were captured by gathering ideas from selected stakeholders, however, as the change was classified as 'behind the scene' other stakeholders were not involve and their requirement assumed to be 'an instant access to books'.

In CS6, within the improvement process the third stage is 'explore', which is used only by project team (i.e. selected BDSO member and internal consultant), to do root cause analysis and

countermeasures for better understanding of the current process rather than capturing expectation. SIPOC is used to list the stakeholders, followed by stakeholder analysis, to understand which stakeholder holds the power for making decision on implementation of the change. The resulting improvements were based only on key stakeholder with power to make decision, i.e. BDSO and Finance, but still the means of defining the expectation was informal and unstructured. Senior Managers and Finance were however involved before implementation, to get their support in implementation phase.

In CS7, the informal approach between Finance manager and Erasmus manager on explaining the problem, while explained the stakeholder requirement were done by putting yourself in the customer position and use of judgment, and reviewing the process with the key stakeholder i.e. Erasmus coordinator, to narrow down the process requirements. Even so, the means of defining expectation is unstructured and informal, however the importance of stakeholder expectation is realised, 'it is required to keep everyone happy by keeping the interest of the university in mind'. The case involved the stakeholder (table 5.6) in implementation phase to communicate why the system had changed, what has been improved, and where to find the documents. The involvement was not to elicit the expectation, but it was for gaining support for implementing the new system.

In CS8, in understanding the stakeholder expectation, academics were involved. However, the involvements of the academic was with the aim of guiding the process mapping and streamlining the process by removing waste. Therefore, the representation of the stakeholder was not to capture requirements but to understand the current process. Developing current and future state map was based on removing waste, rather than delivery of expectation (this will be clarified further in the section 5.2.3).

In CS9, to understand the stakeholder expectation, report of complaints from HR-staff was reviewed, while a few academics were involved on the early stage of diagnostic too. However, their involvement was for mapping the process details.

In CS10, the methodology used is to understand the 'customer' point of view not 'stakeholder'. And the method used was to study the complaints from customer, divide them into value demand and failure demand, followed by categorising the demand on capability chart to find out the impact of waste on the 'customer'. The channel in place for capturing the general customer requirement is through the helpdesk. The involvement of departments within the project was with the aim of understanding the customer interaction point, not to capture their expectation. The method is based solely on VOC, not VOS.

In CS8 and CS9, highlighting the future state map was developed based on removing waste, in order to investigate whether the waste is based on the value specified from the balanced stakeholder expectation or not, all cases were reviewed against diagnostic question 3.

5.2.3 Quantified and balanced stakeholders' requirements

This section clarifies whether the studies improvement projects quantify, prioritise and balance stakeholder expectation or not. The approach taken is to consider the following:

- Have the stakeholders' expectations been quantified, prioritised and balanced to streamline the value flow in a structured manner?
 - Yes, a formal process used to quantify, prioritised and balance the stakeholders' expectations
 - Partially, a formal process is used to balance expectation from key stakeholder
 - No, requirement are defined which balance cost and efficiency, while issues are considered in an ad-hoc manner

	Yes	Partially	No
CS1			✗
CS2			✗
CS3			✗
CS4			✗
CS5			✗
CS6			✗
CS7			✗
CS8			✗
CS9			✗
CS10		✗	

Table 5.9 Quantifying and balancing stakeholder requirements

In CS1, the requirements are not balanced, and the main driver of the project was doing more with less resource, by having a more efficient process.

In CS2, the requirements are not prioritised, and the driver of the project was being more cost effective. The stakeholder requirement alignment was predetermined by the project team with reasoning that 'staff do the input and review to the system and it is expected to be accurate and

efficient, on the other hand students get the output and they expect it to be ASAP and accurate. This indicates the stakeholder requirements are aligned', while in the wider picture, there are much more to consider.

In CS3, the value is defined as 'time' and does not balance the requirements. It is assumed by project team that there should not be any clash on requirement alignment.

In CS4, it has been assumed that all the stakeholders have a fix expectation, and therefore their expectation should be aligned to the project setting the value as cost effective, based on this standard Lean fundamental.

In CS5, the improvement is based on the assumed fixed stakeholder expectation i.e. 'expecting the service works' and value was to release the stock worth £80k.

In CS6, development of the future state was not based on balanced stakeholder expectation but on a more efficient process. The BDSO project team decided the alignment of requirements by designing what would be the best system to suit the departments for the whole process.

In CS7, although the need for having sight on the change of expectation as an internal drive had been realised, there is no formal process in place to balance stakeholders' expectation. The project is led by removing waste and being time efficient, and the effect of the expectation change from the stakeholders with high authority and power only, have direct impact on the system aim and functionality.

In CS8, there is no standard process in place for balancing stakeholder requirements, and the set value is time and accuracy, based on removing waste from the system. The reason provided for the lack of alignment investigation was that the service needs to be within the expected standard set in place by the educational authority. However, the expectation from the stakeholder could have still been captured, aligned, and balanced with the standard in place.

In CS9, developing the current and future state map was based on removing waste, and not balancing stakeholder expectations. Despite this fact, the project was specified to remove waste. It is mentioned that it is Muri based and the improvement put in place was by strategy alignment to the defined process and activities of recruiting, with the tangible benefits of removing any overburden and frustration.

In CS10, the expectation of only the customer, as the main stakeholder is aligned by using the frequency of value and failure demand. As only the demand of customer was taken to account the expectation is believed to be aligned and based on that, the value steps for the system were set as:

- Access to the fault
- Able to diagnose it first-time
- Fix it

5.2.4 Defined balanced requirements to guide service effective improvement

This section reviews whether the balanced requirements of stakeholders have been used in developing the solution for the improvement of an effective service.

- Have the defined balanced requirements been used to guide optimisation of service effectiveness?
 - Yes, balanced stakeholders' requirements have been used to guide optimisation of service effectiveness to ensure meeting existing and emerging needs
 - Partially, only critical interaction of stakeholders within value stream are defined
 - No, lost sight of stakeholder voice, not able to manage all, and only ensure efficient delivery of the service

	Yes	Partially	No
CS1			X
CS2		X	
CS3			X
CS4			X
CS5			X
CS6			X
CS7			X
CS8			X
CS9			X
CS10			X

Table 5.10 Defined balance requirements to guide optimisation of service improvement

CS1, Having had the main driver of the improvement as doing more with less, set the long term aim of the improvement as returning books to shelves within 24hrs. Even though the improvement has been in place for an academic year, the aim is not achieved as it was realised the process did not respond to the improvement, and in result it was needed to employ more resource. It is not known how effective the improvement has been towards stakeholder satisfaction, as there is no measure in place. There are forms provided by the library in which customer can fill any complaint or feedback

in general, which is expected by the improvement leader that any issues can be communicated through the same channel. Losing stakeholders' voice from the start as the improvement team understood it is demanding and costly to reply to stakeholder extreme demand, directed the improvement towards using Lean to aim for delivering the service with less resource in shorter time which was failed.

In CS2, the Swimlane and dependency diagram is done to clarify how many times the information has been shared, which led to the web-based application as the future state of the service. Based on the information flow, the critical interaction of the stakeholder is defined but the improvement has not been guided by their balanced requirements. The drivers of the improvement were failure demands complaints from students, and business needs on budget and resource changes. After developing the solution, a meeting has been put in place for getting feedback and identifying areas of further improvement. This indicates they did not get it right first time.

In CS3, while the aim of the improvement was to have data available, for everyone, faster, the effectiveness of the improvement towards the stakeholders' satisfaction is graded as neutral. The paper-base system changed to an electronic-system however, sight of stakeholder voice within the improvement was lost despite ensuring efficient delivery of a process within the service.

In CS4, having the economic situation as a driver for the improvement, led the improvement towards efficiency. The effectiveness of the project is graded based on a saving of £40k, i.e. being cost effective, rather than service effectiveness to ensure stakeholders' requirements.

In CS5, the Lean project was to improve the service for delivering the workload with less allocated staff. Losing the sight of stakeholders' expectation while believing the stakeholder expectation must be that off expecting the service to work and counting the process as 'behind the scene'. The improvement was considered effective as it could release the £80k worth inventory to be used by customer. The improvement has been in place for four years with the aim of giving access to the books within 24 hours, but the aim has been extended to 2 days so far, as there has been a realisation of other process impacts. Not having a thorough review of the service, and setting the value, based on defined balance stakeholders' expectation, made the improvement cost effective, with however, an unachievable aim.

In CS6, step 6 within the standard process used in improvement is 'Review' which is indicated as a critical step to verify whether the problem-solver truly understood the current situation well enough, this is after implementation step (step 5). With having the value as being more efficient, even though it is mentioned having staff satisfaction, standard process across the departments,

bringing the team together from different departments. But the solution was based solely on the BDSO project team interest. The single system should be used as a communication method for all the stakeholders, but it provided BDSO with more power and influence on having all of their required information. The value of increasing the efficiency was selected after finishing the project, while realising that there is no tangible benefit from the improvement. Therefore, the improvement was only improving part of the process within the service, which is used by BDSO, containing their required information while sight of other stakeholder requirements was lost.

In CS7, when the value is set as being time efficient and had been communicated within implementation phase with other stakeholder (by training them on new developed system), it has not used the balanced stakeholder expectation as a guide on service effectiveness optimisation. The channel to capture any expectation is issues raised by the stakeholder in monthly meeting after the implementation.

In CS8, the value decided based on removing waste, as time efficiency and accuracy. While the time efficiency side is covered by freeing up resource time, the quality side is expected to happen by allowing staff to have more time to deliver better quality service. The stakeholders requirement is not considered, however it was believed by the improvement leader that the improvement must have been effective in stakeholder satisfaction and issues can be raised for the project team for refinement.

In CS9, the move from a paper-based to the computer-based system with the focus of getting right information to the system was done by development of a software template to specify the mandatory fields to be filled by academics for HR. The improvement is classified as very effective towards the stakeholders' satisfaction, by reducing the inefficiency and waste. However, there is no specific measure in place. Moreover, there is no method proposed for taking to an account the stakeholders' requirement guiding the service improvement.

In CS10, while the improvement by using Vanguard model is mainly based on mind-set of 'system thinking' but the overall improvement is about designing the system to deliver customer demand. The customer demand is captured through value demand and failure demand, i.e. existing demand but does not propose any method for emerging need as well as 'how' the value required to be delivered by the customer. The requirements in nature evolve and change in time, not having fundamental requirements in place and leave it to be reported as 'failure demand' or 'value demand' shows the basic requirements from the service is not delivered yet. Putting the improvement solely based on existing demand of the customer, would only highlights the area requires improvement by a single stakeholder, rather than a balanced requirements from

stakeholders. Moreover, solving the issues only based on the customer complaints, and then put measures in place to review the impact the solution has to other stakeholders including the customer (this time by asking customer for feedback and involving them), can create a delay in getting the solution right first time.

‘Right first time’ is one of the main concepts of Lean. A review of the effectiveness of the improvement the cases against this concept are shown in table 5.11:

Case study	Right First Time
CS1	There is no measure in place to capture the effectiveness of the improvement. The aim set for the project was not met and had to refine it after the implementation
CS2	There is no measure in place to capture the effectiveness of the improvement. Reduction of the negative feedbacks, not elimination of the negative feedback, i.e. still going through refinement.
CS3	There is no measure in place to capture the effectiveness of the improvement, rather than the process owner satisfaction from the improvement. Based on received feedbacks after implementation, it is mentioned that there are still areas to improve.
CS4	No measure in place, and cost-effectiveness substituted the service-effectiveness.
CS5	The proposed aim was not achieved and after the implementation, it had to be changed.
CS6	There is no measure in place to capture the effectiveness of the improvement. By removing inefficiency in the process and sharing data, it is indicated that chasing from PI's has been stopped, however the effectiveness of the service delivery is not assessed.
CS7	There is no measure in place to capture the effectiveness of the improvement. Receiving informal feedbacks from stakeholders monthly, on further refinement
CS8	There is no measure in place to capture the effectiveness of the improvement. Issues to be raised for project team post-implementation for further refinement
CS9	There is no measure in place to capture the effectiveness of the improvement. There is no feedback process in place, the improved web-based form communicated as mandatory to be filled
CS10	Measure in place to gather data and feedback on customer satisfaction, first time fix and part arrival Refinement on solution based on feedback from customer and the system condition

Table 5.11 Effectiveness and right first time delivery of the improvement

Looking at the ten cases tabled it can be inferred that achieving right first time does not appear to be an aim as, further refinement of the solution after implementation through stakeholder feedback and complaints is anticipated in each case.

The common areas between the reviewed cases are identified as:

- Having a feedback stage for identifying areas for further improvement before the implementation phase -any change in solution is less costly if it is made in the design phase rather than further development to accommodate additional requirement with extended project resource, time and cost as a consequence. Dealing with feedback independently does not allow the improvement to balance and understand the alignments or clash between the requirements thoroughly. On the other hand for the requirements, which are subsequently identified as required for an effective service delivery, not being able to accommodate it after development can reduce the standardisation of the process (standardisation was the aim of most cases) as it leads to an increase of the 'workarounds' used within the process, leading to a reduction of standardisation. Having developed a system which is not being used by all stakeholders might therefore be the result of not considering the value-drivers defined from stakeholders' expectation.
- Using general i.e. not designed specifically for the project, communication channels for stakeholders to raise issues is a reactive approach to manage the demand delivery i.e. managing failure demand. Although having a communication channel between the service provider and other stakeholders is a positive point, using it as the only method for post-development improvement is not necessarily ideal.
- Improvement is counted as effective through having no negative impact;- not reviewing whether the existing system in place is fit for purpose for the stakeholders to deliver effective service is a step that is skipped, while the efficiency of what is already in place is used as the aim for improvement. Having no negative feedback can be the result of a process step within the service being automated or improved in a way that it can be done in shorter time, when all the other step prior and after remain the same. Variation in the process therefore remains for other stakeholders, for whom the service has not appeared to improve.
- Value should be the core of the project on which the aim can be based on, but the reviewed case studies do not demonstrate this. Indeed the value was based on what had been set as an aim e.g. to improve efficiency, create greater resource, and be cost effective.

It can be concluded that improvement of a service with multi-stakeholder and different processes will be less complex and with lower risk if the value-drivers are set based on defined stakeholders' expectation at the outset of the project.

As shown in table 5.12, the common point in developed the solution in 7 out of 10 of the case studies was the use of "Technology" to facilitate "Information flow".

Case Study	Use of Tech	Reason for using Tech
CS2	SAB/PAB application	Flexible, accurate, no delayed data
CS3	Centralised excel form, New part added to current application (BID)	Remove the delay, and waiting for information
CS4	Central excel sheet, PC provided	Better communication and in result removes the waiting, raise the responsibility level
CS6	Centralised system	Remove bottlenecks in communication
CS7	Centralised excel form	Facilitate sharing of information, remove delay
CS9	Software template	Specify the mandatory field for providing required information to HR
CS10	Excel sheet on FIFO job list	Communicate the progress and record of jobs

Table 5.12 Use of technology to facilitate the information flow

The use of technology in all the above mentioned cases enables the efficiency i.e. "ability to accomplish a job with a minimum expenditure of time and effort". However, this does not guarantee the effectiveness of the delivery of the service i.e. "adequate to accomplish a purpose; producing the intended or expected result" for all stakeholders.

The fact that Lean improvement aims for better information flow to gain perfection in processes is the point used to remove a bottleneck within the process. However, the important part to be considered is that the removing of a bottleneck from the process which value does not go through will not remove waste or save time. In other word, it is important to evaluate that this step in the process is required within the service. This is done by considering the voice of stakeholder, before attempting to make it efficient and thus reducing the possibility of having a sub-optimal outcome for the project.

A both Bicheno and Womack have noted "Doing the wrong thing right is not effective, you can be effective only by working efficiently towards value" (Bicheno, 2012)and hence, "failure to specify value correctly before applying Lean can easily result in providing the wrong product or service in a highly efficient way" (Womack and Jones, 1996b).

5.3 Summary

The review of the cases has shown that the more complex the process, where functional boundaries and multiple stakeholder were involved, the greater the likelihood that all the relevant stakeholders would not be fully engaged, that their requirement would not be appropriately understood and this could lead to a sub-optimal outcome for the project overall. None of the cases as demonstrated in table 5.13 and 5.6 , investigated:

- Represented all the stakeholders' at the outset of the project
- Provided a formal process to capture and determine all stakeholder requirements,
- Quantified, prioritised and balanced the stakeholders' expectations
- Used the balanced stakeholders' requirements to guide optimisation of the service effectiveness to ensure meeting existing and emerging needs.

A formal process to capture all stakeholders' expectation				Stakeholders' expectation have been quantified, prioritised and balanced				Balanced stakeholders requirements used to guide optimisation of service effectiveness to ensure meeting existing and emerging needs			
	Yes	Partially	No		Yes	Partially	No		Yes	Partially	No
CS1				CS1				CS1			
CS2				CS2				CS2			
CS3				CS3				CS3			
CS4				CS4				CS4			
CS5				CS5				CS5			
CS6				CS6				CS6			
CS7				CS7				CS7			
CS8				CS8				CS8			
CS9				CS9				CS9			
CS10				CS10				CS10			

Table 5.13 Overview of the cases against diagnostic questions 2, 3, and 4

The research problem highlighted within the literature review indicating that a missing model or method to define the value-drivers at the outset of the project, in order to identify the value stream and make the value flow, was confirmed within the further primary study with the case study organisation. It has confirmed that current practice does not include the use of models or framework that addresses the key issues.

Therefore, as it was indicated in chapter 2 the research aim is **“to provide a means of identifying and prioritising stakeholder requirements at the outset of an improvement project, such that, in meeting the business needs the resulting outcome provides a ‘better fit’ solution for all stakeholders.”**

Model Development

6.1 Introduction

The gap previously established in the literature review and shown within the original research on the 10 case-studies presented in the last chapters that even though in literature, it is advised that the most successful organisations are those that act as an intelligent organisation who are able to receive information, interpret it and translate it quickly and effectively into something of economic value (Womack, 2011). It is also essential to address more than just processes within a Lean transformation in order to effect sustainable positive change (Bateman et al, 2007), and the service provided in HE seems to miss this opportunity. Hines (2008) in his paper for a Lean University suggests ‘value-stream and value-system’ to be able to overcome the gap of Lean thinking within the HE. The value-system is recommended for the active capture of the customer need by using set of tools such as Six-Sigma, Marketing, Agile manufacturing, System dynamic, Theory of constraint, and Revenue management. Although each of these tools have been used in management for a long time and been approved, they still do not give any specific guidelines on the first step of Lean i.e. “Identify Value” in HE Service. The tools can facilitate the way towards “Customer Value” but in analysing the main problem, which is trying to manage all stakeholders’ expectations to enable an improvement project to be perceived as successful, still remains elusive.

The issue has never been the lack of useful tools or proven techniques (Neely and Jarrar, 2004) as most tools for data analysis, interpretation, and visualisation have been around for many years and various disciplines have provided numerous ways to extract value from data, for example Industrial engineering developments, Quality Management tools, and Information Visualisation techniques, among others (World research Inc, 1999).

The reason behind missing this opportunity is within the current HE Service, stakeholders requirements are based on internal knowledge and past experience, and the Voice of Stakeholder (VOS) is lost within the project. Adversely, in HE services all the stakeholders are not usually incorporated into and represented at the outset of the project. Therefore, a set of tools will not be the answer for making Lean effectively applicable to the HE Service.

The “Value” definition is understood to be:

- In all organisations the customers’ value is linked to the use of some product or service, which means the customers’ value is different from organisation value
- Stakeholders’ value is something perceived by the stakeholders, not specifically by only the manager or service providers or via the objectives set within the organisation
- Finally these perceptions involve a trade-off between the service and the stakeholders

However the uniqueness of the HE Service character, challenges the Value definition to a wide extent:

- Service is more or less intangible; Services are activities or a series of activities rather than objects
- Services are produced and consumed simultaneously
- The customer participates in the production process to some extent, i.e. the customer also is considered a stakeholder
- Specifying ‘value’ desired by multi-stakeholder is complex

In this research the aim is to develop a model to guide the improvement projects when considering ‘value drivers’:

- “that in order for an improvement project to be perceived as successful from a stakeholder perspective their requirements would need to be understood at the outset of the improvement project and that where complexity includes multiple stakeholders, with a number of objectives, these would need to be identified and prioritised. And that in order to provide consistent results and sustained improvement, this action should be an explicit part of the improvement methodology utilised”.

The Research problem had been specifically driven from the root definition of the relevant concern as sub- research problem:

- H1.1 Represent all the stakeholders at the outset of the improvement project
- H1.2 Establish a formal process to capture and elicit all the stakeholder expectations
- H1.3 A formal process to quantify, prioritise and balance the stakeholders’ expectation in order to streamline the value flow in a structured manner
- H1.4 The defined balanced requirements to be used to guide optimisation of service effectiveness to ensure meeting the existing and emerging/anticipated needs

The progress of the model development on each intervention is done based on designing a stage while validating what has been developed in the previous stage i.e. an iteration cycle during the

development phase. This chapter covers the model development while validate each stage in testing it within an actual improvement project.

6.2 HE Service project improvement pre-model archetype

The ‘defining Service Value-drivers pre-model archetype’ (figure 6.1) is the visual representation of the initial brainstorm that has been put together within this research. The archetype pre-model is developed as an initial visual overview to the diagnostic questions. The focus began in the ‘Service’ provided in HE, as the starting point of the brainstorm. The range of provided services will produce a data set. Alternatively the service would have range of stakeholders who need to be present and engaged, and this will create a data set as well.

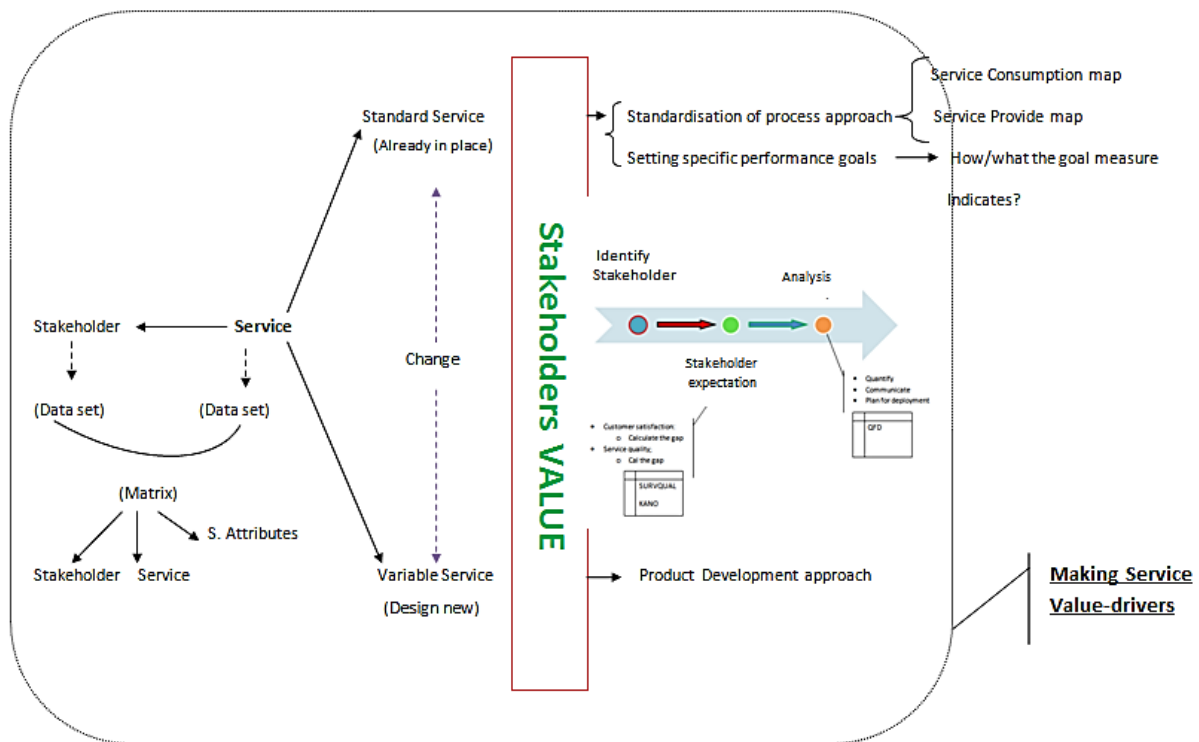


Figure 6.1 Defining Service value-driver pre-model archetype

The combination of the two data sets can produce a matrix, which includes the service, stakeholders and their expectations. The improvement on service can be either on a standard service which is already in place or on variable services which need to be designed as a new service. Regardless of the type of the improvement on the service, it was established there is a need for ‘stakeholder value identification’ at the outset of the project. The stakeholders’ value filter is defined into:

- identification of stakeholder,
- stakeholder expectation,

- analysis; this is where balancing, quantifying, and trade off the expectations for the best overall solution needs to happen.

Based on the Literature review, stakeholder value identification improves the decision-making process for successful business therefore within the project improvement ‘stakeholders’ value’ can work as a filter for any improvement. The output is highlighted as ‘value-drivers’ for the service and these can guide the improvement, while the development of the solution is in progress.

6.3 VOS-model Developments

The ‘VOS model’ has developed as the ultimate model based upon its focus on the Voice of Stakeholder. The VOS-model evolves through four main overall phases:

- **Learning** about the service and stakeholders expectations give an insight for capturing and developing VOS;
- **Core-drivers** are the value drivers which are selected from VOS for the service
- **Alignment** is where the improvements are aligned and guided with the defined value drivers
- **Deliverables** are the recommendations made as a solution for the improvement with the guidance of the value-drivers on the service

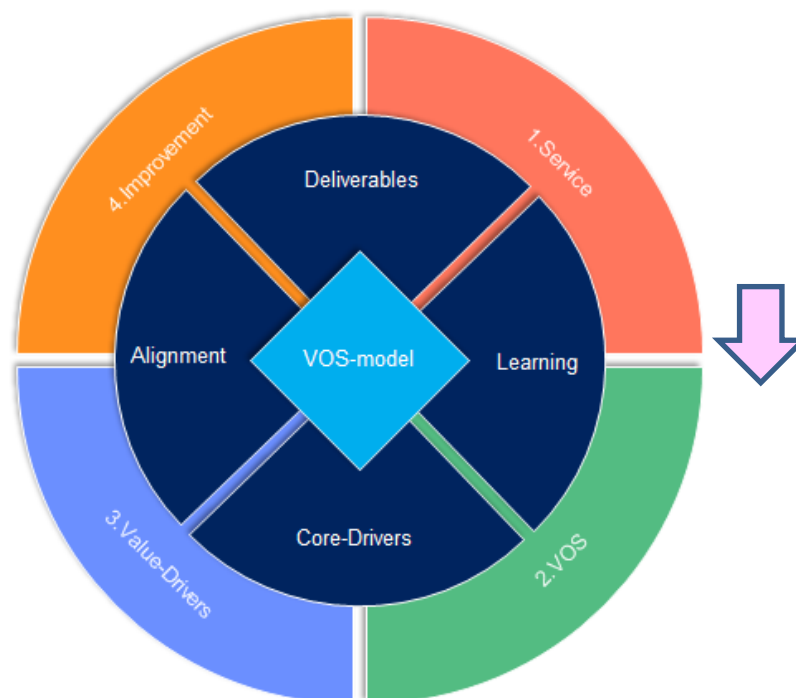


Figure 6.2 VOS-model top 4-phases

The 4 phases of the VOS-model evolved onto the 8 stages through testing and iteration of each stage within actual improvement projects. These will be explained in details later on. The VOS-model 4 phases consists of 8 stages:

Stage 1	Identify Service range
Stage 2	Selection of the Service
Stage 3	Stakeholder representation and classification
Stage 4	Listing expected attributes by each stakeholder from the Service & their shared interest
Stage 5	Narrow down the attributes from each stakeholder to the ones with highest impact to the Service
Stage 6	Trade-off between Business performance and VOS
Stage 7	VOS transition to Value-drivers
Stage 8	Finding the Gap

Table 6.1 VOS-model stages

Structural presentation of the VOS-model against the four phases, which represent the sequence of steps and highlights the user for each stage, is presented as;

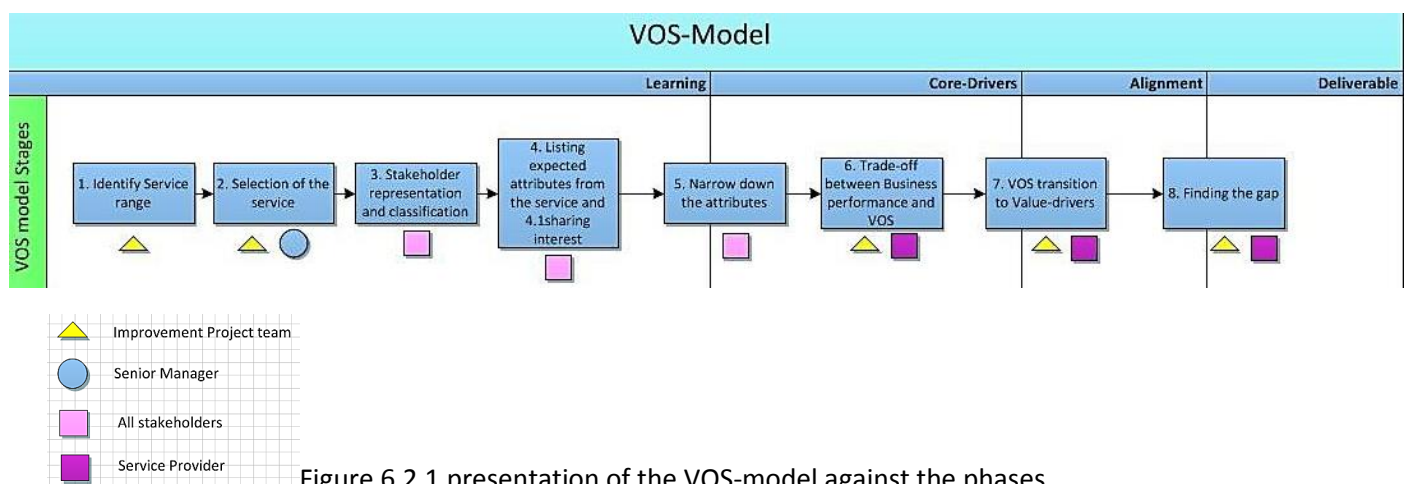


Figure 6.2.1 presentation of the VOS-model against the phases

The VOS-model was developed with adoption of tried and tested methods, which were relatively simple but often missed out, and gradually this became more progressive and specific.

Taking a step back the development of VOS-model initially started with reviewing the available tools, and as shown in table 2.32, the findings from the stakeholder management and engagement cases, could deliver expected output around the areas of the sub-research problem, such as:

1. Balanced score card
2. Quality Functional Deployment (QFD)
3. Six Sigma, Critical to value (e.g. CTQ), and
4. Kano model

Regardless of the different areas of the business which the tools had been focused on, they all had similarity on highlighting the importance of Customers' Value and aligning it with Strategy (Balanced scorecard), Functionality (QFD), Quality (Six Sigma CTQ), and the dynamic aspect of Customers requirement which changes based on time passing by (Kano). All tools assumed the Value is clearly set and known by the business and did not recommend any methodology to define the value. In addition there were areas within the literature review on stakeholder management, which informed the likely approach of the VOS-model development.

Based on all the improvement projects cases reviewed in literature, and models such as Moore (2004) Lean improvement starts by looking for areas where immediate attention is necessary to improve service. This informed; ***the idea around the need for specifying the area that requires attention for improvement, leading to listing the service range within the area.***

On System Thinking and as described by Hines (2008), Radnor (2011), Waligo (2013), Roos (2003) and Ason (2007), a common understanding of the system and service is required for an effective improvement, and as service is build up from stakeholder interaction, it is critical that the involvement of stakeholders within the project for it to be an effective improvement. This informed; ***the idea behind the sub-research problem (H1.1) on representation of all stakeholders.***

Despite the available approach for narrowing down the stakeholders to only key stakeholders who have power, the lesson learned (table 2.32) from the stakeholder management cases acknowledges stakeholders as a core component of service implementation, and represented all the stakeholders through grouping the stakeholder to gather and eliciting expectation from both internal and external customers. This was presented through a structured method of communication to capture requirements as a list of key objectives from stakeholders. Therefore, instead of disqualifying any stakeholder, as the common approach to reduce the complexity of multi-stakeholders involvement and management of expectations, this informed; ***a formal process to capture and determine all***

stakeholders' requirements, with balancing of the expectations rather than disqualifying any stakeholder, to ensure the project improvement considers all the stakeholders' perceptions.

The approach which formed the bases of this part of the VOS-model was due to the concern raised in the literature review regarding the reason behind decision failure in organisations that did not understand stakeholder interest and the importance of determining who to involve in a structural way while making key decisions.

QFD matrix feature (figure 2.1.2), presented the possibility of capturing all stakeholders and their expectations, with the transformation of 'service range and stakeholders' matrix to 'stakeholders and expectations' matrix.

The concept of CVD (Customer Value Determination) indicates managing a long list of preferences of consequence value dimensions and is not practical for the organisation, as it cannot work on so many different values and requires the need to screen customer value. Additionally the findings from cases on table 2.32 listed the aspect of value that the task can contribute, rather than ranking tasks as V.A, and N.V.A (i.e. solely waste realisation). This indicated that; **the prospect for managing the complexity with a method to select and narrow down the expectations as key requirements in critical manner.**

After narrowing down the expectations, Kano model (figure 2.1.1), detailed the possibility of trade-off between the business performance (i.e. the service aim) and narrowed down expectations.

A manageable prioritised list of expectations i.e. VOS, now needed to be translated into technical and aim-driven statements. As expectations can be raised by a wide range of stakeholders with different backgrounds, it is important to have a step in the VOS-model which can translate VOS to Value-driver. The concept in Six Sigma for developing 'Critical to Quality', Delivery, and Time, was used as a starting point for developing this stage.

For guiding the optimisation of service effectiveness, the findings from stakeholder management cases (table 2.32) recommended delivery of only the V.A processes effectively through the development of value-drivers and evaluating how the value is added. This specified that; **the use of defined requirements is a guide/value-driver of service effectiveness.**

For developing of the VOS-model, the Meredith (1989) research cycle (refer to figure 3.4) was used as a continuing cycle of description, explanation and testing, whereby each stage generated new knowledge and created learning points for working forward.

6.3.1 VOS-model implication in project phase

The review of preliminary studies and literature established the Lean improvements in HE-service were all project based. Although Lean has been approved as an applicable and powerful technique in delivering benefits, it does not offer any project management techniques. In order to clarify at what point in the project life-cycle, the VOS-model can be implemented the model was mapped against PRINCE2 project phases.

Based on PRINCE2 material, a project contains of the main stages of:

- **Pre-project**
- Initiation
- Subsequent delivery
- Final delivery

As it was reviewed on 2.9.7, PRINCE2 places the emphasis on stakeholder analysis during start-up phase of the project. The 'pre-project' is considered the start-up stage of the project in PRINCE2 and is designed to make sure the pre-requisites for initiating the project are in place, while ensuring the information required for the project initiators is available. Pre-project needs to have a Project Mandate which defines, at a high level, the reason for the project and the output sought. Additionally within Pre-project, there is also the requirement to ensure that the information required for the project team is available, so that the Initiation stage plan can be formed and created.

While the VOS-model is designed to be used in the Pre-project phase in an effort to mitigate the resistance to change, have insight to the Voice of Stakeholders, and have a holistic view of the service for the appointed project improvement team, it also facilitates the delivery of the objective within the Initiation stage, as well as throughout the project, providing a clear insight to the value and a chance to review the improvement progress against the identified value. The areas in which the VOS-model facilitates the objectives of the initiation stage are:

- Agreeing on whether there is sufficient justification to proceed with the project, i.e. feasibility of the project
- Ensuring there is a firm and accepted foundation to the project from the stakeholders prior to commencement of the work
- Providing the baseline for the decision-making processes required during the project's life cycle.

6.4 VOS-model Stages

Having established the fact that when people design a process, they do not always take into account the stakeholders' point of view or that by being too busy to develop the process, they get lost on what the service aims and the stakeholders' expectations are. Developing a model to help the process or project originator to satisfy the stakeholders and consider the expectations through the development can fill the gap and have huge impact on effective improvement.

- ***The Model is aimed to work as a 'navigation framework' to get the project originators to an end result in a controlled manner.***

This stage of the Model requires answers to the following questions:

- Who; involving of the **right people**
- What; improving the **right service**
- Where; Checking things are being done in the **right place** within the process timeline i.e. intention of doing the right activity for improvement

As some services may require a more tailored and complex approach than traditional standard offerings (Vandermerwe, 1988), then the model should focus on 'alignment' and 'complexity' management throughout the stages by ensuring alignment between stakeholders and reducing the variation complexity. As Angelis (2012) specified, in value-focused processes such as Lean, the alignment ensures that all supply-chain parties focus resources on the given value. The output of the framework has been set to 'Value-drivers' based on 'Voice-of-stakeholders' and this is ready to be used as the improvement goal and identification of the gap.

The Model consists of several stages and each has an output. The output of each stage works toward building up:

- Clearer expectations
- Less ambiguity regarding the value definition,
- Better management of the improvement project.

In addition to the typical success of Lean application, e.g. reduced process time, reduce lead-time and improved quality, the VOS-model reduces any rework or reactive improvements and costs associated with them.

The user is able to select from a set of tools in each stage to help with decision making (DM). The VOS-model is completed as a framework, building upon the output of each stage. The reason behind using DM points is, if in the future, something goes wrong in the service, or for use in continuous

Improvement, there is the opportunity to track back to see what and why certain decision were made, and have analytical procedures in each stage.

The project cases used in development and validation of the VOS-model were:

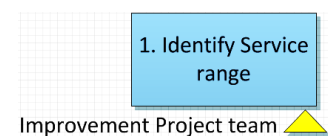
Case	Stage Design	Stage Validation
Case 1. IT Service	Stage 1	Stage 1
Case 2. University International Visa service (Tier4 Visa)	Stage 2, 3,4,5,6	Stage 1,2,3,4,5,6
Case 3. Course and Module creation service	Stage 7,8	Stage 1,2, 3,4,5,6,7,8

Table 6.2 Project cases used in design and validation of VOS-model Stages

The reason for selecting each case was explained in the VOS-model stage development.

The important point taken from the literature review is to use the John Seddon system thinking with regards to the initial approach to put in design process. This is the need to start with a common means of understanding between the workers and managers on how the work is accomplished. This establishes a common language which can be built upon. The workers and managers can use this common language to understand how the service works and prevent only improving performance as the knowledge is based on them working together in delivering the service. However, Service provider as workers and managers are not the only ones who can effect or be affected by the service therefore when determining the range of stakeholders, a more holistic approach should be taken. The aim was ensure that not only the customer is considered but also the range of stakeholders for the service. Having the overall idea of array of stakeholders working on specific area of the business for improvement as a project, was the starting point for the VOS-model development.

6.4.1 Stage 1-Service Range



Initially, there was the need to know which area of the University required the most attention for improvement. Aiming at the right area and reviewing its service range for improvements and to determine who the stakeholders were, planned to be the first challenge that needed to be overcome.

The VOS-model started with an investigation about the ‘**service range**’ within the **selected area**. The area of improvement can be selected based on a known problem or higher-level analysis. Determining where is best for the organisation to start and recognising the bigger impact, the key

area of business for improvement can be deduced. The decision can be based on the economic situation, marketing research, KPI, new sets of regulation in place, or decisions made by senior authorities of the HE. Following the decision being made on which 'Area' requires the most attention, the 'service range' which is provided by that 'specific area' needs to be gathered.

For gaining a better understanding of the business before selecting the area of improvement, there are different tools which can be used, for example, SWOT, PEST, Porter's five forces model, and KPI's.

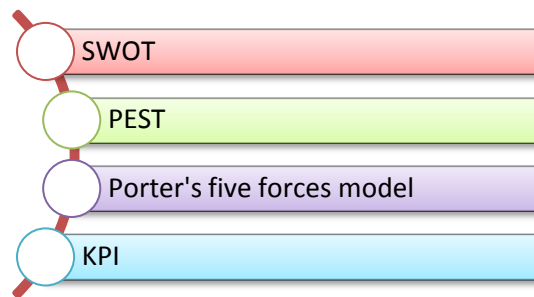


Figure6.3 Analytical tools for understanding business

SWOT analysis can be used in conjunction with PEST to investigate and discuss the Opportunities and Threats within the Political, Economic, Social and Technological side of the business. Porter's five forces model helps in understanding the business and the environment the industry is working in, the only point which needs to be considered for using Porter's model is the fact that it presumes the world is in a stable condition. KPI review the type of performance measures already set in place.

▪ **Case 1, IT Services:**

As Coventry University continues to rise in the league table standings, IT Services (ITS) has been selected by the Vice Chancellor (VC) and senior managers as the area requiring improvement. The case was selected for development and test of stage 1 as it showed the characteristics of needing improvement, provided large number of services, and served the whole university (i.e. wide variety of stakeholders).

The process started with listing all of the services provided by IT (refer to Appendix 17), and surprisingly there was not a single document that could be referred to which presented the range of services provided within IT. As a result, it was necessary to investigate different means such as; website, meeting with managers, actual output i.e. systems in place, and review of daily activities of the IT staff in order to determine the services offered. The number of services provided by the IT was 87 and each was delivered through different sections; - Central computing, Local delivery, Network, Information system, and Programme Management Unit. The 'range of services' provided by IT as a department made surprised everyone as it offered a visibility across the department rather than isolated interpretation of the service. Meanwhile, the visibility of the service range highlighted

the issues, such as, having different names for the same service, which made the service offered by the specified system alien to others within the University, e.g. iTrent is the HR system for booking staff holidays, however this service is called CHRIS by staff at the University.

The unique characteristics of the HE service environment, in which the service is produced and consumed simultaneously, highlights the importance of knowing the stakeholders from the start, both for hearing their voice as well as to communicate the changes well in advance, for having thoroughly successful improvement. Based on that, once the 'service range' was gathered, the aim was to represent 'stakeholders'. Stakeholders in a broader sense include every individual or group that could influence or could be influenced by the organisation or systems (Freeman & Reed 1983), and in this specific matter by the service. Therefore a list was compiled of every individual who could influence or be influenced by the provided service.

Based on nature of IT, the services provided were mainly IT systems. Going through the process of selecting the stakeholders, it was discovered that the 'service provider' was the best person to list the stakeholders, as they are the one who know the service the best and deal with daily or long term interaction with the stakeholders. Therefore the 'service provider' was made responsible for gathering the stakeholders list for the service. (Refer to Appendix 17.1 for list of stakeholders).

Mapping the 'service range' against the 'stakeholders' and highlighting their service interest created a matrix. In case1, the responsibility for offering a service in some cases, overlapped between two areas, the main service-provider and the maintainer of the service and these were differentiated by two colours, in the matrix. (Refer to Appendix 17.2 for complete overview of the matrix).

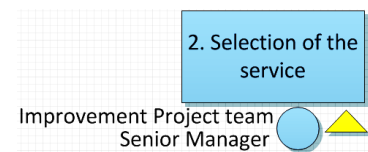
By listing all the stakeholders against the service range, and capturing their requirements (refer to appendix 17.3) increased the visibility from the start, but the complexity amplified. This raised the requirement for having a structured and focused approach.

Therefore, a decision was taken to redo the stage 1 iteration and rewrite it to be;

- Listing the services provided within the area requiring the most attention for improvement
- Producing the '**Service range**' as the output of stage 1 for the selected area that requires improvement.

The visibility that the first stage offered to the department helped them conclude that the department requires a more detailed service range database which can include the Service Level (SL) agreement between the stakeholders as well as much more detailed information. The project was converted to a new project; - "IT Service Catalogue", which still is under-review, design, and development with management and the Head of IT department.

6.4.2 Stage 2-Selection of the Service



Once the 'service range' list had been compiled for the particular area of the business, it was necessary to narrow down the service range to more specific services for a more focused improvement. Stage 2, attempts to determine the service which requires the most attention for investigation between the ranges of services in the 'Service Range' table. The decision regarding the selection from the services was made based on the situation the University is in and their preference.

▪ Case 2. University International Visa service (Tier4 Visa)

The second stage was developed and tested through the new project, within a different area of the university i.e. University International Visa area (International Visa compliance area). The project was selected as it fitted to the criteria of what area required improvement, it also fulfilled the requirement for identifying multiple stakeholders as well as requirements for simplifying the process.

The decision about the area for the second case which required improvement was made by the senior heads of the University. There was also a new requirement put in place from UKBA as a must have for all the Universities within the UK.

Stage one i.e. listing the services provided in the area was done at stage validation:

– Pre-arrival visa process service
– Post-visa granted monitoring (police registration)
– Post-study visa monitoring
– Visa extension
– Correcting of mistakes made on entry clearance
– Visa refusing
– Send application for student batch scheme

Table 6.3 stage 1, service range in University Visa service area

There are different tools available for analytically selecting the specific service within the service range which requires improvement the most, for example, Boston Matrix and Impact/effort analysis.

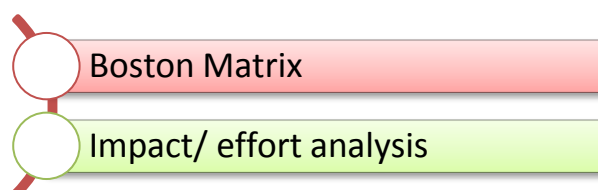


Figure 6.4 Analytical tools for selecting the service within the service range

Note, while the tools are mentioned as examples, the list is not limited only to what has been mentioned. From the provided service range, the ‘Post-visa granted monitoring’ was selected, as it had higher impact on the output expected from the UKBA.

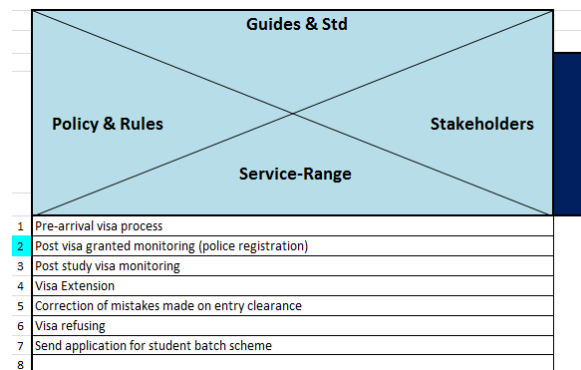
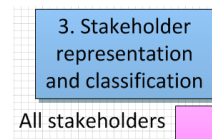


Figure 6.5 Selected service within the service range, case 2

- Stage 2 was designed to select the service within the service range, with
- The output of “**The Service**” for investigation to either develop or improve.

6.4.3 Stage 3- Stakeholders representation and classification



Not having the right people involved would lead to the repetitive representation and involvement of only service-provider/owner and project coordinator as was shown in Lean improvement in chapter 2, and 4.

Following on from stage 2 where ‘the service’ was selected for improvement within the University international visa area, in stage 3, the requirement is to represent all stakeholders for the service.

Typical stakeholders include managers, people who work in the process under study, upstream and downstream departments, customers, suppliers and finance (William, 2000).

– UKBA	– IO Student support team
– UKBA Compliance team (University)	– International Students
– Academics	– Registry
– IT	– QAA

Table 6.4 stage 3, Stakeholder in University international Visa service

Transferring the listed stakeholders to the matrix, made the ‘Stakeholder, Service-range matrix’.

<div> <div>Guides & Std</div> <div>Policy & Rules</div> <div>Stakeholders</div> <div>Service-Range</div> </div>		UNI International visa Stakeholder							
		UKBA	IO Student support team	UKBA Compliance Team (uni)	International Student	Academic	Registry	IT	QAA
1	Pre-arrival visa process								
2	Post visa granted monitoring (police registration)								
3	Post study visa monitoring								
4	Visa Extension								
5	Correction of mistakes made on entry clearance								
6	Visa refusing								
7	Send application for student batch scheme								
8									

Figure6.6 Stakeholder, Service-range matrix, case 2

Differentiation of stakeholders is usually based on same form of marketing segmentation e.g. age and other demographic variables, however this method is problematic for HE as how the stakeholders are differentiated is dependent upon what value is defined. Additionally the interaction between the stakeholders is likely to be missed in this approach. Therefore rather than classifying stakeholders based on primary and secondary or weighting the most important stakeholder as the key stakeholder, the VOS-model proposes a way to consider all stakeholders in the same level i.e. no stakeholder will be disqualified.

The aim of this is to build towards an effective performance by covering stakeholders' existing and emerging requirements. This means there should not be a trade-off or domination between the stakeholders.

The Stakeholder classifications are done against 'the Service' selected in stage 2. The classification is purely to maintain the importance of all the stakeholders' impact, and to consider their voice for making sure that the right issues have been tackled. Classification was done on stakeholders based on their role and relationship with the service.

The stakeholders are classified under 3 main categories:

- A. Service Provider (**SP**)
- B. Service Receiver (**SR**)
- C. Affected/Interested Stakeholder (**AIS**)

'Service provider (SP)' or 'Service owner' is the stakeholder who is responsible and accountable for providing the ultimate service to the 'Service Receiver'. They are also the ones who decide about any changes to the service, in other words an 'SP' is the service stakeholder whose neck is on the line if anything goes wrong.

'Service Receiver (SR)' or 'ultimate customer' is the one who approves the service, i.e. the stakeholder who if not satisfied with the opportunity for offering the ultimate service, will be lost.

‘Affected/Interested Stakeholders (AIS)’ are the ones who are involved in the process of delivering and evolving the information towards the ultimate service.

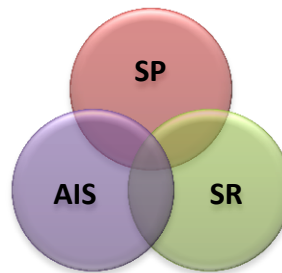


Figure6.7 Stakeholder classification

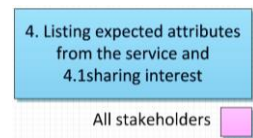
In the Post-visa monitoring service (case 2), the UKBA Compliance team (University) have been selected as SP and the UKBA as SR, while the International Office (IO), Academic, Registry, IT, Quality Assurance Agency for Higher Education (QAA), and International student were considered AIS.

Service Range								
Post visa granted monitoring								
UKBA	IO Student support team	UKBA Compliance Team (uni)	International Student	Academic	Registry	IT	QAA	
SR	AIS	SP	AIS	AIS	AIS	AIS	AIS	

Figure 6.8 Post-visa monitoring service stakeholder classifications

- Therefore stage 3 is designed as a representation of stakeholder and classification;
- The output of stage 3 is ‘**Classified stakeholder**’ to assure the project is scoped and will tackle the right issue.

6.4.4 Stage 4-Listing the expected attributes by each stakeholder from 'the Service'



When it was shown in the literature that identifying stakeholders concerns are key drivers for each stakeholder and that it is useful in both developing and understanding a system (Muller, 2004), The available models and original research established the situation where improvements are all based on SP expectations, which include the regulations in place and their priority on how to streamline the process. Whereas the SR and AIS voices get lost and are not taken to an account, while increasing the risk of transferring the problem either from one area to the other or reducing task allocation from one area and increase of tasks required to be done by the other areas as a delegation. All in all, in a holistic view of the system the scenario can only envisage the case where no improvements are being made, as the inefficiency still remains within the system. Communication is key to maintaining relationships with stakeholders and, moreover, that communication must adhere to certain formal conventions which sufficiently and reasonably cover the “drama” of what is going on in an organization (Smudde, 2011).

To remove the risk of a non-holistic improvement, all stakeholders need to have the right to state what their expected attributes are from the service in this stage. No criticism of an idea is allowed and expected attributes are recorded exactly as spoken. Qualitative data in the form of stakeholder accounts provided a source of well-grounded, rich descriptions and explanations of processes (Miles & Huberman, 1994). In stage 3 by not disqualifying any of the stakeholders, part of the aim being covered is the requirement to gather their expectations.

Stage 4, of the VOS-model works on capturing what is desired from the Service by each Stakeholder. Knowing the range of stakeholders involved in the service, this stage allows the understanding of how wide the various expectations are, whether they all have same expectation, or if any clash. This visibility shows the alignment between expectations and the tension between stakeholders.

The VOS-model is not designed to provide a solution in case of tension between the requirements, but it is designed to be explicit in revealing the tension and alignments to enable the participants to address them consciously for the integrity of the decision.

This is done by moving from ‘stakeholder, service range matrix’ to ‘classified stakeholder, service attributes matrix’.

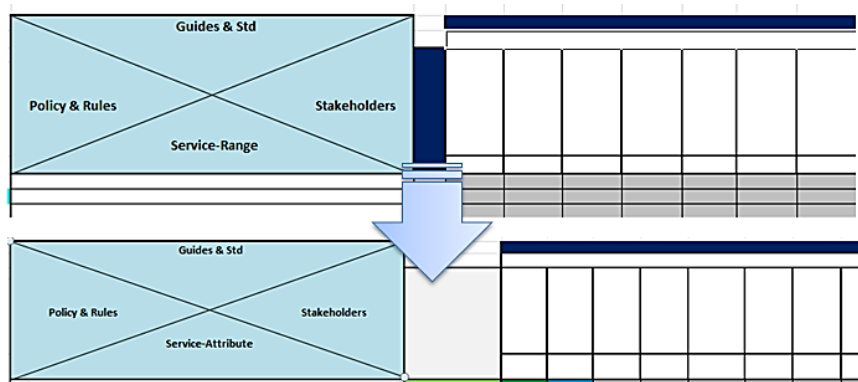


Figure 6.9 'Stakeholder and service range' matrix to 'classified stakeholder and service attributes' matrix

To elicit the requirements from each stakeholder, there are different tools or methods available, from face-to-face meetings to questionnaires, brainstorm sessions, formal/informal interviews, ground-tours and many more.



Figure 6.10 Methods to elicit and capture stakeholder expectations from the service

Once this is done and aligned with defining the required level of details for identifying the value-driver, prior to any improvement, there needs to be a mapping the value stream or solution development to streamline the process.

Case2 had been used to test of the designed stage 4, for capturing the expectations and level of complexity. The method used for the case to gather the attributes was through both one-to-one meetings and Group meetings. However, due to the researcher's status, i.e. being Student and Staff, access to the full information was denied by the Compliance team and the case could only be used to test the stage to a certain level only (to stage 6).

The output of the meetings was to create a set of expected attributes from each stakeholder for 'Post-Visa monitoring' service.

<div>Guides & Std</div> <div>Policy & Rules</div> <div>Stakeholders</div> <div>Service-Attribute</div>		Service Range								
		Post visa granted monitoring								
		UKBA	IO Student support team	UKBA Compliance Team (uni)	International Student	Academic	Registry	IT	QAA	
		SR	AIS	SP	AIS	AIS	AIS	AIS	AIS	
A1	Granted HTS									
A2	Granted Tier 4 till end of education period									
A3	Inform if the student granted visa haven't enrolled									
A4	Directory of student data									
A5	Maintain the HTS status									
A6	Current and satisfactory full inspection, audit, review									
A7	sustainable system in place to enable sponsor duties									
A8	Report student status interaction university endorsed to use for sponsor management									
B1	Easy to access the monitoring system									
B2	The reporting doesn't need extra time allocation									
B3	Maintain my student visa during the study									
B4	advise on any changes which may put my visa on risk									
B5	Accessible staff to facilitate & advise the process of visa from pre-arrival, arrival, on course, and post study									
B6	Clear notification of my duties to maintain my visa on course									
B7	The system is helpful and efficient in a way that I can trust any problem I have can be resolved quickly									
C1	System which allow us to keep and monitor accurate student record									
C2	Able us to produce reports from system data to be updated and confirmed by schools									
C3	Have the option to produce report on tier4 students to UKBA									
C4	Issue CAS									
C5	Flexible to be updated by relevant UKBA regulations and any changes									
C6	To be able to hold the relevant documents for each students in the system									
C7	A systems which highlights the not attending student within the expected period									
C8	Permission to update and maintain students' personal details on the system									
C9	Able us to have an overall set of information on students files been uploaded without going through different files									
C10	Attendance monitoring									
C11	Have the option to make us able to track the student with changed circumstance									
D1	Place to refer for support/advise on odd occasion/cases									
D2	Standard clear set of responsibility									
D3	Spend minimum time as possible to gather required data by UKBA									
D4	Shared Access to the students attendance profile for the whole semester									
D5	Accessible/helpful team to advise on UKBA process and changes									
E1	Being able to find out when the student is not engaging (for both tier4, and welfare purpose)									
E2	Being able to contact the student (available update student contact details)									
E3	Being able to plan the student peak time support all the application									
E4	time scale in terms of appeal, to know when the result will be back, to plan when to offer what support to the student (communication with students)									
F1	Service ownership around it									
F2	Governance and policies around the service									
F3	ongoing reviews									
F4	Monitoring of the service incase of sustainability									

4.1

Figure 6.11 stage 4, in case 2

Once the expected attributes from each stakeholder were gathered, it was determined that there was a commonality of interest from other individuals. Therefore, within the same stage, a step was included to review 'sharing interest' as stage 4.1.

This was done by going vertically within the matrix from the specific stakeholder through each attributes. In the case where any of the mentioned attributes/expectations are of interest to the other stakeholders, it should be highlighted in a different colour in the 'classified stakeholder, service attributes' matrix. In this case 'Blue' was selected. The different colour was selected to visually differentiate the attributes mentioned by specific stakeholder within the first instance, with those highlighted later in the stage as in agreement on with other stakeholders. As shown in figure 6.11, attribute D5, mentioned by academic, were of interest of IO student support team too.

The certain stakeholders in case 2, i.e. Registry and QAA did not accept the meeting request therefore no requirements were listed against them in the matrix.

- Stage 4, is designed to elicit and list the requirements from each stakeholder;
- Stage 4.1, is designed to highlight the commonality and shared of interest from other individuals on requirements specified in stage 4,
- The output of stage 4 is the '**classified stakeholder and service attribute**' matrix, which contains Attributes vs. Classified stakeholders (from stage 3) for the Specified Service (from stage 2), and their shared interest.

Within stage 4 and onwards in the model, having an analytical skill set in the improvement team would help to gain a better understanding of service, business, environment and priorities. This stage can take longer compared to other stages because it needs to gather data, while requiring analysis of the information for better understanding of the whole service and stakeholders. By reviewing the attributes, it was realised the same service was revisited from different aspects by the stakeholder:

- UKBA attributes (A1 to A8) was elicited from the fixed regulations set in place for the University. The attributes were mostly around better understanding of a student's status during their study period, while the University establishes a Highly Trusted Status (HTS) certificate and has in place sustainable, trusted audit system
- International Students added requirements (B1 to B7) for clear communication on changes, duties and for an easy accessible monitoring system to check-in

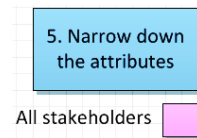
- UKBA Compliance Team within the University, requirements (C1 to C11) covered the aspect of auditing the system for monitoring the students have accurate records, and capability of the system to produce the required specified reports
- Whereas, Academic had to participate in the process but did not see any value added to their main responsibility from their involvement. Their requirements (D1 to D5) were mainly on spending minimum time on the activities related to this service, either when they face odd cases or within normal cases for gathering required data
- International Office mentioned attributes (E1 to E4) where it covered the planning side of the service in dealing with the number of students and being able to provide the required service, as well as providing contact details availability and monitoring side of the service. Meanwhile they were in agreement with the attributes mentioned by Academic (D5) ‘Accessible/helpful team to advise them on UKBA process and changes’
- IT by mentioning attributes (F1 to F4) covered the aspect of how the system is managed, i.e. ownership, Governance, and monitoring the sustainability of the service on a more technical level.

An interesting side to hearing stakeholders’ voice was, regardless of whether they were SP, SR or AIS, the points mentioned were all relevant aspects of the service which was required to be considered for a successful improvement.

Having a big list of expectations from all stakeholders is seen as a big challenge, an unmanageable task to overcome, and the main reason for not involving all the stakeholders in the improvement within the reviewed cases and models.

A list of 35 expectations was defined in case 2, without the trade-off between the stakeholders (i.e. not disqualifying any stakeholder). Therefore, it was required to design the next stage in a way to sort the unmanageable list, to a manageable set of attributes which could be used going forward.

6.4.5 Stage 5-Narrow down the attributes of each stakeholder to the one with the highest impact on the service



Now the stakeholder expectations are understood, and the relationship in between the attributes is reviewed, there is a need to select the key attributes in a critical manner. This is to select the attributes regardless of who mentioned them, and having a strategic method in place for the trade-off between the attributes. This responsibility is allocated to each stakeholder to prioritise which had most important attributes over others within the ones they mentioned.

Measurement is the process of assigning numbers to things in such a way that the relationships of the numbers reflect the relationships of the attributes being measured (Neely, 2007). In this type of a measurement it is not the same as the object being measured, but is, instead, a representation of it (Neely, 2007). The two tools which can assign numbers to a qualitative attributes in order to measure the relationships of attributes against each other are:

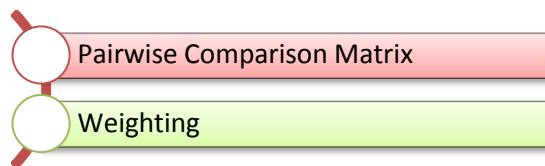


Figure 6.12 Methods to compare the attributes

The suggested tools can facilitate the process of comparing entities in pairs to judge which of each entity is preferred, while the qualitative attributes get assigned quantitative numbers. The tools are suggested so the selection between the attributes happens in a critical, systematic, and standardised manner across all the stakeholders in stage 5.

In Pairwise comparison matrix, the attributes with the highest percentage, get selected over the others. In weighting attributes, weights are allocated to each of the attributes which would reflect their relative importance, and the one with the highest will be selected.

Pairwise comparison matrix was used in case 2 to select the critical attributes. Pairwise comparison was used because of its feature in offering a clearer picture of trade-offs between the attributes.

			Comparison	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11		%	
C1	System which allow us to keep and monitor accurate student record	UKBA Compliance Uni team	C1		C2	C3	C1	C5	C1,C6	C7	C8	C1,C9	C10	C1,C11	4	6.5	
C2	Able us to produce reports from system data to be updated and confirmed by schools		C2			C3	C2	C5	C6	C7	C8	C9	C10	C11	1	1.6	
C3	Have the option to produce report on tier4 students to UKBA		C3				C3,C4	C5	C6	C7	C3	C3	C10	C11,C3	6	9.7	
C4	Issue CAS		C4					C5	C6	C7	C4,C8	C9	C10	C11	2	3.2	
C5	Flexible to be updated by relevant UKBA regulations and any changes		C5						C5	C5	C5	C5	C5	C5	9	14.5	
C6	To be able to hold the relevant documents for each students in the system		C6							C7	C6,C8	C6,C9	C6,C10	C11	6	9.7	
C7	A systems which highlights the not attending student within the expected period		C7								C7	C7	C7	C11	8	12.9	
C8	Permission to update and maintain students' personal details on the system		C8									C8	C10	C8,C11	6	9.7	
C9	Able us to have an overall set of information on students files been uploaded without going through different files		C9										C9	C11	4	6.5	
C10	Attendance monitoring		C10											C10,C11	7	11.3	
C11	Have the option to make us able to track the student with changed circumstance		C11												9	14.5	100.0

Figure 6.13 Use of pairwise comparison in UKBA compliance team attributes

For reviewing the use of pairwise comparison on case 2 within stage 5, refer to Appendix 18.

- Stage 5 is designed to narrow down the attributes elicited from each stakeholder in a structured manner, to ones with highest impact to the Service
- The output of stage 5 is to create a set of the most important attributes titled as 'VOS (Voice of Stakeholder)'.

In this stage, by narrowing down the attributes from each stakeholder in a systematic and standard manner, the transition from Attributes to the output of VOS is accomplished.

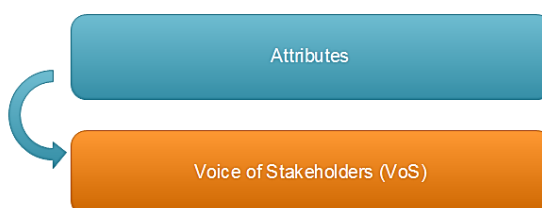


Figure 6.14 Transition of attributes to VOS, from stage 4 to stage 5

It is possible that a stakeholder may determine that two attributes are as important as each other when doing the comparison, such as;

Post-Visa monitoring	UKBA Compliance team (University) between; <ul style="list-style-type: none"> - C1; System, which allows us to keep and monitor accurate student records - C6; To be able to hold the relevant documents for each student in the system Selected both C1, and C6
----------------------	--

Table 6.5 Allocating equal priority to two attributes (further analysis)

Analysis of this selection would help the project leader/manager or improvement team understand the prioritisation of each stakeholder to a better extent. The Soft System approach explained by Checkland (2000) appreciates that problems in human activity systems are difficult to define

considering that everyone has their own point of view, and to gain understanding of the problem, it must be understood that there is no 'ideal' solution to any one problem which will satisfy everyone's point of view (Greswell et al., 1995). Looking at this in more detail, the attributes with multi interests from stakeholders highlight that they may have a different combination of selections in pairwise comparison matrix, which can show the use of the same attributes in different ways by each stakeholder depending on their input and involvement with the service.

For instance, in case2, D5 attributes 'Accessible/helpful team to advise on UKBA process and changes' is of interest to Academic and IO. Looking down in each pairwise comparison matrix shows the expectation on 'advise' can have a different mix. For example Academic selected:

- D5 (Accessible/helpful team to advise on UKBA process and changes) with the same importance as D1 (Place to refer for support/advise on odd occasion/cases)
- At the same time, D2 (Standard clear set of responsibility) had been selected as having same importance with D1

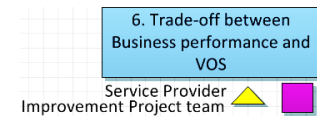
Therefore, while D5 'Accessible/helpful team to advice on UKBA process and changes' for one stakeholder means providing advice on the odd occasion and having the clear set of responsibility, for another stakeholder it means advice on UKBA process and changes.

Or for the UKBA University Compliance Team, the C1 (System, which allows us to keep and monitor accurate student records) has been selected as having the same importance with C6 (To be able to hold the relevant documents for each student in the system), C9 (Able us to have an overall set of information on students files being uploaded without going through different files), and C11 (Have the option to make us able to track a student with changed circumstance). These attributes with an equal importance put an understandable frame around what the expectations are from the UKBA University Compliance team about what the system should include.

These clarifications will not be done in the normal process that currently is being used, i.e. starting with mapping the value stream. The captured expectations and the process of comparing their importance against each other by each stakeholder, technically and analytically, leads the improvement to be a more effective and successful improvement, with clarification on the environment and its stakeholder understanding of the service. This can reduce the risk of working on an incompatible solution for the current situation.

The VOS-model works as a navigation framework guiding the improvement through understanding and analysis, rather than a machine which works on a set of input data to give an output.

6.4.6 Stage 6-Trade-off between Business Performance and VOS



From stage 5 in the set of selected attributes, i.e. VOS has been selected by each stakeholder in a structured manner through quantifying the qualitative attributes and narrowing them down to the most important ones. The VOS was listed in a table with their initial coding number as well as the stakeholders classification from the matrix in stage 4.

	VOS	Stakeholders
A3	Inform if the students granted visa haven't enrolled	SR
A6	Current and satisfactory full inspection, audit, review	SR
A8	Report student status interaction university endorsed to use for sponsor management sys	SR
B7	The system is helpful and efficient in a way that I can trust any problem I have can be resolved quickly	AIS
C5	Flexible to be updated by relevant UKBA regulations and any changes	SP
C11	Have the option to make us able to track the student with changed circumstance	SP
D3	Spend minimum time as possible to gather required data by UKBA	AIS
E1	Being able to find out when the student is not engaging (for both tier4, and welfare purpose)	AIS
E2	Being able to contact the student (available update student contact details)	AIS
E3	Being able to plan the student peak time support all the application	AIS
F1	Service ownership around it	AIS

Figure 6.15 VOS mapped against Stakeholder classification (case 2)

Stage 5 enabled the attributes to be quantified at there was a requirement to prioritise and balance the VOS by considering time and business criteria. Therefore understanding the dynamic aspect of how stakeholders' requirements change over time, whilst having the business criteria in mind, is what is planned to be achieved in interval 6. Consequently analysis was required of the VOS against the level of impact they make on the service whilst prioritising the VOS based on the business criteria (service aim).

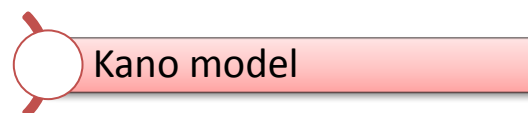


Figure 6.16 Kano model to facilitate the trade-off between Business performance and VOS

The Kano model methodology was used to look at the VOS prioritisation based on the specific section of the business providing the service (i.e. the service aim from business perspective). The classification was described as:

1. **Fundamental**; the VOS which are aligned with the fundamental reason for the service being in place, i.e. a must for the business to function effectively (to be visualised in **YELLOW**)
2. **More is better**; those VOS which are formed by the increase in business performance over time i.e. increase the stakeholder experience through additional information and functionality (to be visualised in **GREEN**)
3. **Delighter**; VOS which can bring real 'extra' benefits to the business while still continuing to deliver the service (to be visualised in **CHERRY RED**).

The colour was selected based on determining a simple way to visualise the information through the stages (using Lean visual management concept).

Over time, the More is better VOS attributes in the service, become Fundamental expectations, as the expectation cycle is dynamic. Traceable information of existing and emerging needs from the stakeholders perfectly fits with the C.I concept in Lean. This is due to the fact that the need for improvement over time (C.I process) can be monitored and planned with holding actual data.

- Stage 6 is designed to overcome the dangers of over-customisation and financial implications can be experienced, by trade-off between Business performance and VOS;
- The output of stage 6 is a balanced and prioritised VOS showing “**Fundamental, Better to have (More is better), and Delighter**” classifications of the business

This helps to highlight the most important VOS for the service functionality while having an insight on the expectations which are not fundamental for the service functionality but can be dealt with as emerging requirements.

Testing stage 6 in case2 revealed the result as:

A3, “Inform if those students granted visas have not enrolled” is selected by SP as a Fundamental attributes for the business, as the main aim of the ‘post visa monitoring’ service is to provide clear monitoring of the status of student involvement.

E3, “Being able to plan the student peak time to support all the application” is not a Fundamental attribute for the service, however by having it as Fundamental expectation it will ensure there is a planning capability in place to offer a better service.

B7, “Spend minimum time as possible to gather required data by UKBA” is selected as a Delighter because it can bring more benefit to the business, when all the fundamental VOS are in place, helping the service to work perfectly as expected.

	VOS	Stakeholders	Delighters	More is better	Fundamental
A3	Inform if the students granted visa haven't enrolled	SR			A3
A6	Current and satisfactory full inspection, audit, review	SR		A6	
A8	Report student status interaction university endorsed to use for sponsor management sys	SR		A8	
B7	The system is helpful and efficient in a way that I can trust any problem I have can be resolved quickly	AIS	B7		
C5	Flexible to be updated by relevant UKBA regulations and any changes	SP			C5
C11	Have the option to make us able to track the student with changed circumstance	SP		C11	
D3	Spend minimum time as possible to gather required data by UKBA	AIS	D3		
E1	Being able to find out when the student is not engaging (for both tier4, and welfare purpose)	AIS			E1
E2	Being able to contact the student (available update student contact details)	AIS		E2	
E3	Being able to plan the student peak time support all the application	AIS		E3	
F1	Service ownership around it	AIS			F1

Figure 6.17 Balance and prioritisation of the VOS (case 2)

The prioritised VOS is then reordered into the categories and the Fundamental, More is better and Delighters are groups together.

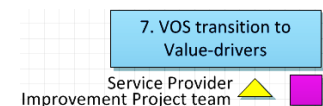
	VOS	Stakeholders	
A3	Inform if the students granted visa haven't enrolled	SR	Fundamental
C5	Flexible to be updated by relevant UKBA regulations and any changes	SP	
E1	Being able to find out when the student is not engaging (for both tier4, and welfare purpose)	AIS	
F1	Service ownership around it	AIS	
A6	Current and satisfactory full inspection, audit, review	SR	More is better
A8	Report student status interaction university endorsed to use for sponsor management sys	SR	
C11	Have the option to make us able to track the student with changed circumstance	SP	
E2	Being able to contact the student (available update student contact details)	AIS	
E3	Being able to plan the student peak time support all the application	AIS	
B7	The system is helpful and efficient in a way that I can trust any problem I have can be resolved quickly	AIS	
D3	Spend minimum time as possible to gather required data by UKBA	AIS	

Figure 6.18 Trade-offed VOS (case 2)

The trade-off table presented visually in the 'fundamental' section show that there are a mixture of AIS, SP and SR VOS. This establishes the importance and criticality of all stakeholder involvement within the improvement by managing complexity of multi-stakeholder service, and quantifying and balancing requirements against business rather than disqualifying stakeholders.

As explained, the 'Fundamental' VOS are the ones that must be in place for the service to function and to deliver the aim, and including only certain stakeholders, would not give a holistic view of existing fundamental needs or emerging requirements.

6.4.7 Stage 7-VOS to Value-drivers



The study of the balanced and prioritised VOS, revealed the VOS are mentioned by a range of stakeholders with different backgrounds and to be able to act on them, they needed to be measurable or orientated with business-management language. While this needed to be done in a structured way, it was important to ensure it was done in a standardised way across all the balanced VOS as well.

The method found to be fit for purpose for stage 7 to transform the VOS was the Six-Sigma approach on finding the Critical to value. The output of the transformation was titled; - 'Value-driver' as these were the ones which linked to service as perceived by the stakeholder, and the perception involved trade-offs between business/service and stakeholder expectations.

This step was designed to take the VOS through two filters of:

- Issue: what is the issue in the current situation which made the stakeholder mention the attribute, and
- Requirements: what would be required to eliminate the issue and deliver the VOS

The combination of the review of VOS, Issue, and Requirement would enable the improvement project team, to define the ‘Value-drivers’.

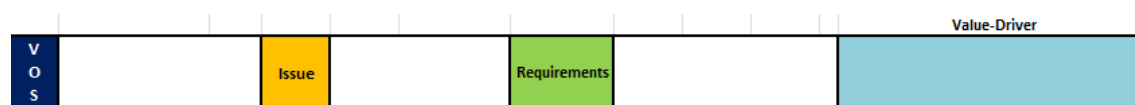


Figure 6.19 VOS to Value-drivers

The SP, who is the stakeholder ultimately responsible for the service, should be involved in this stage.

- Stage 7 is designed to transform in a structured and standard manner, all the balanced VOS to Value-drivers;
- The output of stage 7 is ‘**Value-drivers**’; as the ones which are linked to service as perceived by stakeholder, and the perception involved trade-offs between business (service), and stakeholder expectations.

In this stage, case 2 had to be stopped as the rules in place from UKBA Tier4 (post visa monitoring) and the sensitivity of the service for the University meant getting involved further was not allowed for the Compliance team (SP). However case 3 started to be used for testing and designing stages. The reason for selecting case 3 was because it had the criteria of area requiring improvement with multi-stakeholders, and a complex process. In order to be able to test stage 7, case 3 needed to go through stage 1 to 6 initially. The point in the stage where it was decided to test the case, was when the project was already in the stage of implementation between IT and Registry office.

- Stage one;- Service Range

The area of interest in the business, i.e. the improvement project being introduced in ‘Course and Module’ area, the service-range provided in that area was listed as:

– 1. Course and Module provided in each school
– 2. Course and Module Creation
– 3. Degree offered in each school based on Course/Module provided
– 4. Placements
– 5. Fund for research on specific Course/Module

Table 6.6 The service range (case 3)

- Stage two;- Selection of the service

The Course and Module creation was selected based on the Boston Matrix and Impact and Effort Analysis. The analysis showed the service required low effort while the solution can have high impact for the business based on the current circumstance.

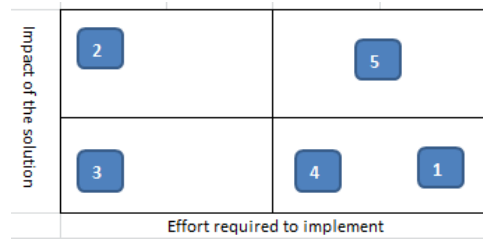


Figure 6.20 Selection of the service (case 3)

- Stage 3; Stakeholder representation and classification

Next the stakeholders needed to be listed as the VOS-model suggested;

– Vice-Chancellor group	– Marketing & Communication department
– JISC	– International Office
– IT Department	– Staff-Support & academic
– Academic Registry	– Senior Administration in Faculties
– Administration in Faculties	– Prospective customers
– Webpage Marketing Ltd	– International office and agents
– QAA	

Table 6.7 Stakeholder representations (case 3)

Putting the information in the proposed matrix in the VOS-model made the Stakeholder, Course/Module service range matrix;

<div><div>Guides & Std</div><div>Policy & Rules</div><div>Stakeholders</div><div>Service-Range</div></div>	Uni Course/Module Stakeholder												
	Vice-Chancellor group	JISC	IT Department	Academic Registry	Marketing & communication department	International office	Staff Support & academic	Senior Administration In Faculties	Administration In Faculties	prospective customers	Webpage Marketing Ltd	International office and agents	QAA
1	Course Module provided in each school												
2	Course Module creation												
3	Degree offered in each school based on Course/Module provided												
4	Placements												
5	Fund for research on specific Course/Module												

Figure 6.21 Stakeholder, Course/Module service range matrix (case 3)

The output of stage 3 and comparing it with the process the project already been through, highlighted the range of stakeholders who had not even been involved, but also not yet been communicated with about the changes and developed solution.

In case 3, 'Staff-support and academic' was selected as SP, and the 'Prospective customer' as well as 'QAA' as SR for the 'course and module creation' service.

Service Range														
Course/Module creation														
Vice-Chancellor group	JISC	IT Department	Academic Registry	Marketing & communication department	International office	Staff-Support & academic	Senior Administration in Faculties	Administration in Faculties	Prospective customers	Webpage Marketing Ltd	International office and agents	QAA		
AIS	AIS	AIS	AIS	AIS	AIS	SP	AIS	AIS	SR	AIS	AIS	SR		

Figure 6.22 Stakeholder classifications (case 3)

- Stage 4; listing the expected attributes by each stakeholder from the service

The methods used to gather the attributes were one-to-one and group meetings. In Course/Module creation case, there were attributes which were in the interest of multi-stakeholders. This is covered by going through stage 4.1. The attributes were shown in green for the stakeholder who specified them and blue for the stakeholders who had an interest in them. This was to aid visualisation of the alignment of expectation for facilitating the integrity of the decision to be made later on (refer to the Appendix 19 for the comprehensive overview of the matrix, output of this stage).

As specified earlier, from stage 4 onwards in the model, having an analytical skill set within the improvement team, would help better understanding of the service, business, environment and priorities. For instance, in case 3, the attributes F5; “Successful course ready to market and recruiting on-time for potential customer” is required by VC group, Marketing and communication department and staff-academics. Having similar expectations shows the stakeholders are having the same aim and they are all working towards the same purpose.

The ‘QAA’ and ‘Potential Customer’ as SR both put forward the same expectation; attribute I2; “Greater dissemination of Knowledge”.

In relation to I2, the other attribute mentioned by Academic as F5, which brought a better understanding of the service; -

F5; “Successful course ready to market and recruiting on-time for potential customer”	I2; “Greater dissemination of Knowledge”
--	---

Table 6.8 Attributes mentioned by different stakeholder (case 3)

“Successful course” is described as the one which transfers a potential customer to being a student, and in order to fit within the QAA rules and expectations for what can attract potential customer into becoming Students or approve the course under QAA, is the greater dissemination of the knowledge.

Translating the greater dissemination of the knowledge into action is something that depends on the level the University is creating the course for, i.e. Master, Bachelor, and Diploma, therefore it needs to be left to experienced and skilled staff to approve it. However, what is important is having the right level of knowledge in place to match the expectation.

Although both attributes are more qualitative rather than quantitative, either on their own or as a mix, they lead the improvement in an explicit direction. So when the service goes awry, the

practitioner with a complete understanding of the service and expectation can tackle the issue to ensure effective improvement.

The holistic overview of the SP, SR, and AIS expectations facilitated the understanding of the expectations and the direction of improvement in more detail.

- Stage 5; Narrow down the attributes of each stakeholder to the one with the highest important on the service

In this stage, the pairwise comparison matrix was used as a tool to assign qualitative attributes to quantitative numbers and narrow down the attributes in a controlled, standardised manner. For instance, Registry decided that the selection of D4, F8, and I1 were the most important attributes.

D4	Can track where are the courses in case of the approval process
F8	When the student enrol on course, set the link correctly between document and student
I1	Improved data quality

Table 6.9 Narrow down the expectation (case 3)

The set of attributes selected to be used in pairwise comparison matrix, are a combination of the attributes mentioned by the specific stakeholder, as well ones they were interested in with other stakeholders (refer to Appendix 19.1 for pairwise comparison on case 3).

Looking in more detail, the attributes with multi interests from stakeholders might have a different selection combination in the pairwise comparison matrix, which can show the use of the same attributes in different ways for each stakeholder dependent upon their input and involvement with the service.

For instance, I1 attribute; “Improving Data Quality” is of interest to the Senior Faculty, Academic and QAA. Analysing each pairwise comparison matrix shows Quality can have a different mix. For example:

- Senior Faculty selected I1 (Improved data quality), to have the same importance as G2 (correlation between other faculties so they do not deliver the same content that others are offering)
- The same attributes have a different mix for Academic, I1(Improved data quality) has the same importance as G1 (Something to help us to develop the market on course/module in the start, e.g. stronger support externally)

Therefore, while “improved data quality” for one stakeholder means not providing duplicated content, for another stakeholder, it means more supporting data for the marketing side of the course/module.

- Stage 6; Trade-off between Business performance and VOS

Narrowing down the expectations through pairwise comparison to the most important ones, the VOS were listed in Figure 6.23. For example, for Marketing (AIS), from their specified expectations, E1 was selected by them using the pairwise comparison:

- **E1** Accurate data for marketing website
- **C17** Creation of the course prospect
- **C18** Supply detailed required data
- **C19** Market/sell the organisation to wider customer
- **F5** Successful course ready to market and recruiting on-time for potential customer

	VOS	Stakeholders
F5	Successful course ready to market and recruiting on-time for potential customer	AIS
B2	To use the project budget effectively to look at the project within the time frame	AIS
C10	Interoperability between related systs	AIS
D4	Can track where are the course in case of approval process	AIS
F8	When the student enrol the course set correctly link between doc and student	AIS
I1	improved data quality	AIS/SR
E1	Accurate data for marketing website	AIS
G3	A how to design content is missing(business development team is required)	SP
G1	Sth to help us to develop the market on course/module in start (stronger support externally)	AIS
I2	Greater dissemination of knowledge	SR
C19	Market/sell the org to wider customer	AIS

Figure 6.23 VOS (case 3)

For trade-offs between the business performance and VOS, the improvement project team and SP prioritised the VOS based on the defined categorisation (i.e. Fundamental, More is better, Delighter);

	VOS	Stakeholders	Delighters	More is better	Fundamental
F5	Successful course ready to market and recruiting on-time for potential customer	AIS			F5
B2	To use the project budget effectively to look at the project within the time frame	AIS		B2	
C10	Interoperability between related systs	AIS		C10	
D4	Can track where are the course in case of approval process	AIS			D4
F8	When the student enrol the course set correctly link between doc and student	AIS			F8
I1	improved data quality	AIS/SR		I1	
E1	Accurate data for marketing website	AIS		E1	
G3	A how to design content is missing(business development team is required)	SP			G3
G1	Sth to help us to develop the market on course/module in start (stronger support externally)	AIS			G1
I2	Greater dissemination of knowledge	SR		I2	
C19	Market/sell the org to wider customer	AIS	C19		

Figure 6.24 Prioritised VOS (case 3)

F5, “Successful course ready to market and recruiting on-time for potential customer” is a Fundamental attribute for the business, as the course/module creation service would not be in place if it couldn’t provide a successful course to the market.

C10, “Interoperability between related systems” is not a Fundamental attribute for the service but for the business, as a service is already in place, the expectation will be improved by the increase in business performance. And C10 will be one of the attributes which would be better to have.

C19, “Market/Sell the organisation to wider customer” is selected as a delighter because it can bring more benefit to the business, while the fundamental VOS are all in place, helping the service to work perfectly as expected. (Refer to Appendix 19.2)

– Stage 7; VOS to Value-drivers

The method used in this stage is the transformation of VOS to Issue and Requirements, and the joint venture of including VOS Issue and Requirements which led to the Value-driver.

For attribute F5, selected as one of the Fundamental VOS for the business, “Successful course ready to market and recruit on-time for potential customer”, the question is ‘what is the issue behind this expectation?’ In the management world, this can come from failures in offering the marketable course or not being ready to market the course on-time. The interviews with stakeholders, in stage 4, gave an insight into what issues the attributes which have been mentioned were based on. The understanding of stakeholder helps the transformation of the VOS to value-drivers with a clearer, more factual and current knowledge. Attribute F5 highlights the issue of; “Marketable course ready prior to recruitment”. The requirements to fulfil this attribute can be; “backward scheduling from the point of marketing, and expert advice on subject marketing”. Considering the VOS, Issue and Requirements, the outline value-driver, is “A development of a course with involvement of marketing experts making a marketable course”.

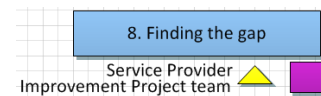
F5						
V O S	Successful course ready to market and recruit on-time for potential customer			Issue	Marketable course ready prior to recruitment	

Figure 6.25 F5 to Value-driver (case 3)

Attribute G3, selected as a Fundamental VOS for the business, “A how to design content is missing (business development team is required)”, highlights the Issue; “joint academic and business view in content is missing”, the Requirement to fulfil it can be; “Business, real life network”. This result is the outlined Value-driver as “Content covering the most updated academic and business knowledge by involving business partners as well as academic subject expert”. Attribute I2 “Greater dissemination of knowledge”, selected as VOS ‘More is better’ for the business, , highlighted the issue of having the “right level of knowledge”, Requirements were set to be “Aim for right audience”, taking to account the VOS, specified issues and the requirements, therefore the value-driver is set as “Evaluating level of the audience knowledge prior to designing the content”.

The colour coding set in stage 6 which displayed the trade-offs between business performance and VOS continues to be used in stage 7 in order to visualise the classification of VOS importance for the business performance. For a complete overview of VOS to Value-driver transaction in case 3, refer to Appendix 19.3.

6.4.8 Stage 8-Finding the Gap



Following definition of the value-drivers for the service aimed to be improved, it was realised that there was a need for discovering the gaps between expectation and the current state of the service. There was a needed to gain understanding of the service development through its different processes, activities, and stakeholder interactions.

This can be done by following the sequential activities and gradually gaining an understanding of the work/information flow. This was through mapping a more complex processing situation, or from simply comparing the current output of the service with the expected output developed from the value-drivers. The table designed to be used, contained the following detail:

- Stage; allows the service to be divided to different intervals if needed
- Actual Output; contains the current output of the service, either broken down into intervals or in more simple situations the output of the service
- Value-Drivers; list of value-drivers colour coded based on their trade-offs with business performance in stage 6
- Expected Output; the statement which includes and shows the extent the value-drivers have been taken to account

[illegible]

Figure 6.26 Actual output and Expected output (case 3)

‘Expected output’ is not a solution but is a statement showing to what extent value-drivers are planned to be delivered, i.e. to deliver the fundamental level only, or whether delivering Fundamental-More is better, or even outputting the Delighters ones.

- Stage 8 is designed to find and highlight the gap between the raised expectation i.e. Value-drivers and the current state of the service
- The output of this stage is not a solution, but is an indication to what extent the value-drivers are planned to be delivered.

A consumption map was determined to be the latest way of mapping value within the service. Consumption maps provide a different way of looking at the problem from the standpoint of the customer. Nevertheless the investigated 'value-drivers' in VOS-model are from Stakeholders rather than only the ultimate customer. Therefore the map needs to cover a wider view of the processes, to deliver the service, from the stakeholder standpoint which includes the stakeholders' interaction points. Hence, in addition to understanding the process of delivering the service, it is important to understand:

- At which interval of the process certain stakeholders are involved
- What level of input each stakeholder has and where in the process do they have that input
- What are the decision points within the process of service delivery
- Each stage of the process falls against which interval of service
- What are the outputs of each interval

Investigating further using the available tools and models there is the understanding, that to map the current state of the service to fulfil all the mentioned requirements above, some of the methods that can be used are (this list can be expanded);

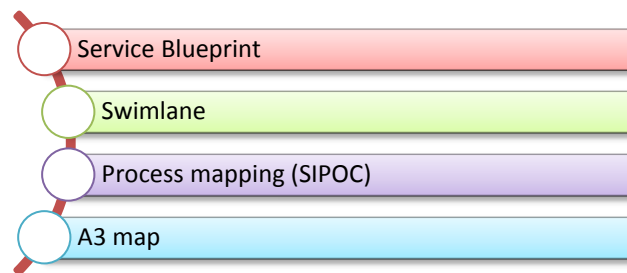


Figure 6.27 Tools to understand the service development process

Service Blueprint is a technique described by Lynn Shostack in 1984, which shows the process within the company basing its division on Customer, Front stage, Backstage, and Invisible support, separated by lines.

Swimlane is a visual method used to show the process flow. It is used to group activities according to their responsibilities, to show how the flow of control over the service production passes from different organisations or stakeholder in a business process.

Both mapping techniques demonstrate visually:

- A process associated for delivering the service
- Level of input and the place of input in the process from stakeholders, however this is shown in general terms as Customer, Front stage, Back stage, and Invisible support
- Decision points within the process of service delivery
- Process against timeline of the service interval

On the other hand the method does not show:

- What are the output/s for each interval
- In each interval of process stage, which stakeholders are involved specifically

The mixture of Service Blueprint and Swimlane has been used for mapping the current state of the service in case 3, and this has been used to investigate the gap between the current state and the Value-drivers. To fulfil the requirements expected in this stage of the model, changes have been applied to the mapping method by adding new divisions as follows:

- **Output** for each phase of the process in Service development
- **Stakeholders** involved in each phase of the process in Service development
- **Value-drivers;** detailing which phase of the process the specified Value-drivers fall into.

The Case3 service has 5 main phases based on the Service Blueprint/Swimlane map of the service. The informal and formal interviews with the stakeholders led to mapping the service. The actual output can be specified as:

Stage	Actual output
Draft Documentation	New program proposal
Stage 1	Q1 form, Initial course approval
Stage 2	Program spec, Business plan and Q1 form
Stage 3	MI, V1,V2,V3,V4,Q2,Q4,V4 forms
Stage 4	Module/Course Marketing ¹

Table 6.10 Case 3 outputs in each phase

¹ Refer to Appendix 19.4 for the description

Allocating the value-drivers within the right intervals can be determined based on their relationship to the interval, impact and the time frame where they can have the most effect on the service.

For example F5 “With involvement of marketing experts in building up a marketable course”, in the best case scenario the following needs to be taken into account:

- At the start of the process, as any change further down the process can be costly for the business
- At the end of the process to make sure the course fits into the expected marketing requirements

Some of the value-drivers can fall in more than one stage within the process as explained above, based on their impact to the service. The value-drivers still get presented by their allocated colours, from stage 6. This method of visualization throughout the framework helps to make sure the fundamental attributes, which evolved to fundamental value-drivers, get the most attention for service improvement over the other two categories.

Stage	Actual Output	Value-drivers
Draft Documentation	New prog Proposal	F5 The course with involvement of marketing experts building up a marketable course
		G3 Content covering the most updated academic and business knowledge by involving business partners as well as academic subject expert
		G1 Academic involvement with business cases prior to the draft concept stage
		B2 The improvement/change takes place within the introduced time frame by the budget provider(IISC)
		I2 Evaluating level of the audience knowledge prior to the designing the content
Stage 1	Q1 form; Initial course proposal	C19 Having accurate marketing data to decide about wider potential customer
		D4 Streamlined process with efficient communication route, for the progress of course/module approval, to the Stakeholders
		C10 Interoperability between systems to eliminate any input duplications
		I1 Continuous review of data to fit with current and up-to-date knowledge (Improved data quality)
Stage 2	Prog spec Business plan Q1	I2 Evaluating level of the audience knowledge prior to the designing the content
		D4 Streamlined process with efficient communication route, for the progress of course/module approval, to the Stakeholders
		C10 Interoperability between systems to eliminate any input duplications
		I1 Continuous review of data to fit with current and up-to-date knowledge (Improved data quality)
Stage 3	M1, V1, V2, V3, V4, Q2, Q4, V4	I2 Evaluating level of the audience knowledge prior to the designing the content
		C10 Interoperability between systems to eliminate any input duplications
		I1 Continuous review of data to fit with current and up-to-date knowledge (Improved data quality)
		I2 Evaluating level of the audience knowledge prior to the designing the content
Stage 4	Module/course, Marketing	F5 The course with involvement of marketing experts building up a marketable course
		F8 reliable enrolment system linked with correct doc
		E1 Provide required data by the marketing team from the Academic expert/Marketing team within the set milestone in project plan
		C19 Having accurate marketing data to decide about wider potential customer

Figure 6.29 Allocation of Value-drivers against the current service phases

This information can be both visually and verbally demonstrated, for instance on the Draft Documentation stage on the Service Swimlane:

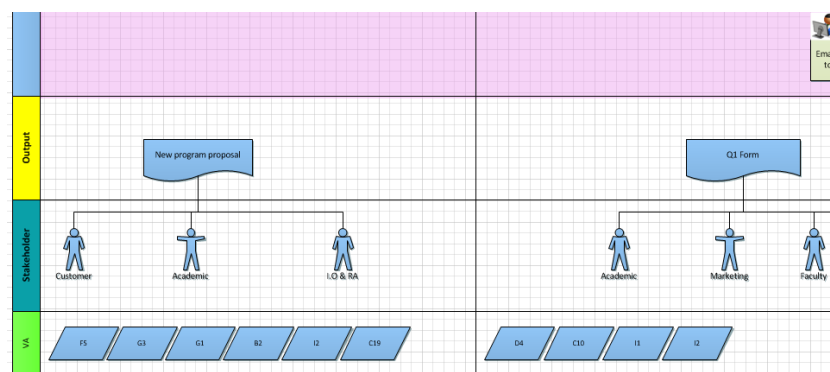


Figure 6.30 Course and Module Service Swimlane Value-drivers allocation visual demonstration

Going through the stages, the Project improvement team and SP will have a holistic understanding of the service, stakeholders, expectations, the environment the service is being offered in, and the process the service is developed through.

The knowledge built is based upon actual clear information, and the analysis of the data puts the practitioner in a better position to decide what the ultimate aim should be i.e. “Expected Output” for the improvement of the service. After demonstrating the gap, the future state of the Service can be mapped and worked on, which can question the process and the stages currently required to fulfil the gap.

Stage	Actual Output	Value-drivers	Expected Output
Draft Documentation	New prog Proposal	F5 The course with involvement of marketing experts building up a marketable course	Marketable, Business-Academic, New prog Proposal for a specific audience
		G3 Content covering the most updated academic and business knowledge by involving business partners as well as academic subject expert	
		G1 Academic involvement with business cases prior to the draft concept stage	
		B2 The improvement/change takes place within the introduced time frame by the budget provider(JISC)	
		I2 Evaluating level of the audience knowledge prior to the designing the content	
Stage 1	Q1 form; Initial course proposal	C19 Having accurate marketing data to decide about wider potential customer	Streamlined process with interoperable systems and reliable data
		D4 Streamlined process with efficient communication route, for the progress of course/module approval, to the Stakeholders	
		C10 Interoperability between systems to eliminate any input duplications	
		I1 Continuous review of data to fit with current and up-to-date knowledge (Improved data quality)	
Stage 2	Prog spec Business plan Q1	I2 Evaluating level of the audience knowledge prior to the designing the content	
		D4 Streamlined process with efficient communication route, for the progress of course/module approval, to the Stakeholders	
		C10 Interoperability between systems to eliminate any input duplications	
		I1 Continuous review of data to fit with current and up-to-date knowledge (Improved data quality)	
Stage 3	M1, V1, V2, V3, V4, Q2, Q4, V4	I2 Evaluating level of the audience knowledge prior to the designing the content	
		D4 Streamlined process with efficient communication route, for the progress of course/module approval, to the Stakeholders	
		C10 Interoperability between systems to eliminate any input duplications	
		I1 Continuous review of data to fit with current and up-to-date knowledge (Improved data quality)	
Stage 4	Module/course, Marketing	F5 The course with involvement of marketing experts building up a marketable course	Clear Marketing strategy(i.e. audience, method, time) with reliable enrolment sys
		F8 reliable enrolment system linked with correct doc	
		F1 Provide required data by the marketing team from the Academic expert/Marketing team within the set milestone in project plan	
		C19 Having accurate marketing data to decide about wider potential customer	

Figure 6.31 The gap (Refer to Appendix 19.5)

For instance consider the Value-drivers for the Draft Documentation stage, the gap is shown between the Actual output “New Programme Proposal” and the Expected output, “Marketable, Business-Academic, New program proposal for a specific audience”.

From this step onwards, there are many tools and techniques which Lean provides to help build up the expected future state. Considering the methods within Lean, suggestions were made for case 3;

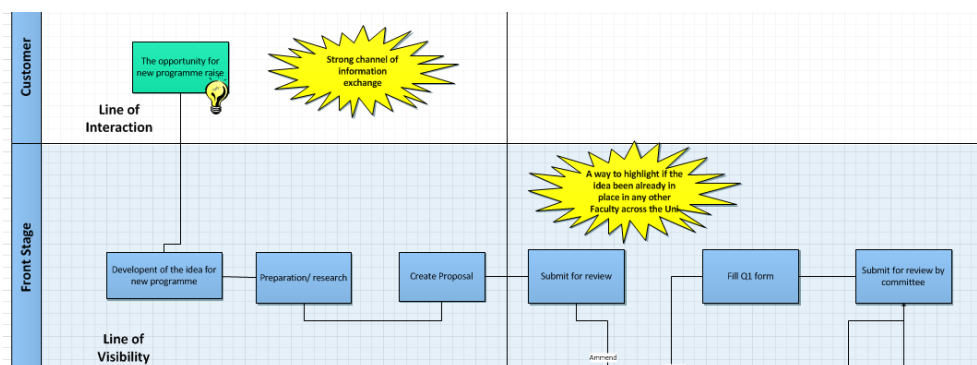


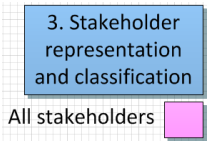
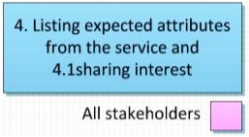
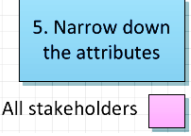
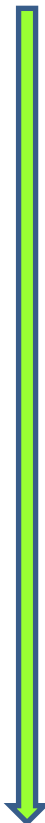


Figure 6.32 Working towards Future state (refer to Appendix 19.6)

The development of the model is summarised in table 6.11, which can be used as the manual for using the VOS-model;

Stage				
	Description	Listing the services provided by the specific area which are based on a known problem or higher-level analysis for those requires the most attention for improvement		
	Output	Service range	Tools	SWOT, PEST, KPI Porter's five force model
	Description	Selecting the service within the service range, which requires the most attention for investigation, based on the University's cooperate plan and preference		
	Output	The Service	Tools	Boston Matrix, Impact/effect analysis
	Description	Representation of all the service stakeholders and their classification based on their role and relationship with the service; <ul style="list-style-type: none"> - Service provider(SP), The stakeholder who is responsible for providing the ultimate service - Service receiver (SR), the one who approves the service as ultimate customer - Affected/interested stakeholder (AIS), involved in the process of delivering and evolving the information towards the ultimate service 		
	Output	Classified stakeholder	Tools	'Classified Stakeholder' and 'Service-range' matrix
	Description	To elicit and list the requirements from each stakeholder, and highlight the commonality and shared interest from other individuals on requirements		
	Output	'Classified stakeholder', 'Service attribute' matrix	Tools	Focus group meetings, One-to-one meetings, Brainstorming meetings, Role playing , Mind mapping, Group meetings, Ground-tour
	Description	Narrow down and quantify the qualitative attributes elicited from each stakeholder in a structured manner, to the ones with highest impact to the Service		
	Output	VOS (Voice of Stakeholder)	Tools	Pairwise comparison matrix Weighting



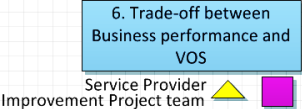
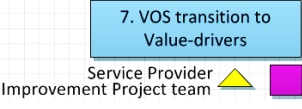
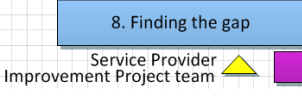
	Description	Overcome the danger of over-customisation and the consequences of financial implications by trade-off between Business performance and VOS. Through analysing the level of impact they make on the service, while prioritising the VOS based on the business criteria (service aim).		
	Output	Balanced and prioritised VOS;- <ul style="list-style-type: none"> - Fundamental, - More is better, and - Delighter 	Tools	Kano model
	Description	Transform all the balanced VOS to Value-drivers in a structured and standard manner.		
	Output	Value-drivers	Tools	Six-sigma approach; VOS, issue, and requirements
	Description	Find and highlight the gap between the raised expectation i.e. Value-drivers and the current state of the service		
	Output	An indication to what extent the value-drivers are planned to be delivered	Tools	Service Blueprint, Swimlane, SIPOC, A3 & Actual output-Value-drivers-Expected output, table

Table 6.11 VOS model manual

6.5 Summary

The VOS-model clearly is not another set of tools, but it is a ‘navigation framework’ which works as a guide to take the practitioner to the point where the right decision for an effective improvement can be made. Even though the ultimate aim of the VOS-model is to clarify the Value-drivers for the Service by considering the voice of all the stakeholders through its designed stages, it offers the opportunity for understanding the whole service and its stakeholders in more detail and facilitates the communication.

The sub-research problem mentioned in start of this chapter is designed to be delivered through:

ID	Sub-research problem	Stages and artefact to support research problem and sub-research problem
H1.1	Represent all the stakeholders at the outset of the improvement project.	Representation of the all stakeholder in pre-project phase stage 1,2,3
H1.2	Establish a formal process to capture and elicit all the stakeholder expectations.	Stage 4 to elicit and capture attributes from all the stakeholders in the specified matrix.
H1.3	A formal process to quantify, prioritise and balance the stakeholders’ expectation in order to streamline the value flow in a structured manner.	Stage 5 and 6 to select the key attributes in a critical, standard and systematic manner across all the stakeholders. Succeeding by balancing and prioritising VOS.
H1.4	The defined balanced requirements to be used to guide optimisation of service effectiveness to ensure meeting the existing and emerging/anticipated needs.	Stage 7 and 8, defined value-drivers to guide and highlight the gap between current and expected output.

Table 6.12 VOS-model anticipated to support research problem and sub-research problem

The VOS-model helps to analyse the current state of service, by its systematic approach into the improvement and value recognition, managing qualitative expectations to quantitative stakeholders’ expectations. To clarify a holistic view of the service while it accommodates flexibility in making any decisions based on the organisation’s situation, set KPI’s, mission and vision.

Table 6.13 demonstrates the stages of the VOS-model and the output, as output of each stage will build a required information baseline and an input for the next stage, none of the stages can be skipped during the model implementation.

Stage	Output of stage	Involved in stage
1. Service Range	Service range in specified area	Improvement project team
2. Selection of the service	The service	Improvement project team & Senior managers of the area
3. Stakeholder representation & classification	Stakeholder-Service range matrix Classified Stakeholder	All the stakeholders
4. Listing the expected attributes by each stakeholder from the service 4.1 Sharing interest	Classified stakeholder, and the service attributes matrix	All the stakeholders
5. Narrow down the attributes by each stakeholder to the one with highest impact on the service	VOS (quantified attributes)	All the stakeholders
6. Trade-off between Business performance and VOS	Balanced & prioritised VOS	Improvement project team & Service Provider (SP)
7. VOS to Value-drivers	Value-drivers	Improvement project team & Service Provider (SP)
8. Finding the Gap	Expected output & the Gap between current and expected output	Improvement project team & Service Provider (SP)

Table 6.13 VOS-model stages review

VOS-model Validation

7.1 Introduction

The previous chapter explained the design of the VOS-model while the stages were tested in 3 different cases. This chapter will cover the developed VOS-model impact and utility validation on improvement projects.

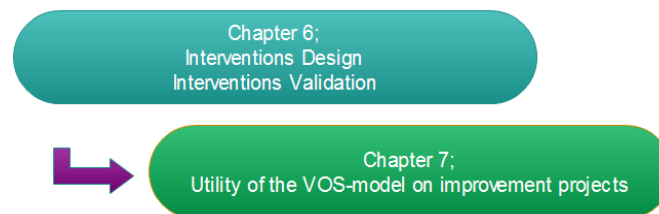


Figure 7.1 Chapter 6, and 7 overview

The validation cases have been selected between the improvement projects at Coventry University. The Coventry University projects were selected because:

- Firstly, the organisation is committed to continuous project based improvement and actively been involved in Lean implementation. Lean principles been applied to institutional processes since 2008 and continuous improvement is explicit in the university's Corporate plan 2015 (Martin, 2011).
- Secondly, services provided by Coventry University consist of multi-stakeholders and in order to deliver them, they have to rely on the involvement of a diverse range of stakeholders.
- Finally, the organisation has been receiving a boost in national ranking- climbing 13 places to 33rd spot overall. Maintaining the place while preparing for further improvement in the national ranking requires improvement in different areas of the University. This would provide a wider improvement projects options to be selected for the VOS-model validation and utility.

To understand the wider utility of the VOS-model, less concern about choosing a particular case has been applied. The cases cover both Operational, Tactical and Strategic areas. To test a wider perspective of VOS-model utility within the HE-service.

The Validation project base cases are:

1. Course and Module creation
2. HESA Report
3. 24/7 IT service support
4. Student information report data-quality
5. IT Asset Management service

This chapter will review the utility of the VOS-model through explaining the cases in a common structure of:

- Background and Purpose of the project
- Summary of the VOS-model implementation
- Validation

And testing and validating the 5-cases against the research objectives;

1. To establish a methodology in order to represent all stakeholders to an improvement project;
2. To develop a methodology to determine the importance of the stakeholder requirements and their relative importance;
3. To develop a means of specifying the value desired by each stakeholder;
4. To design and test a methodology that is able to inform an improvement project such that the project outcomes are aligned to stakeholder requirements;
5. To determine the utility of this methodology in improving stakeholder satisfaction with project outcomes.

Though the VOS-model is designed to be implemented in the pre-project phase, in reality it was not possible to apply the VOS-model in pre-project phase as some of the improvement projects were already started, i.e. the application of the VOS-model was simultaneous with subsequent different project stages. However, in those cases the VOS-model still had been applied through all its stages, providing the opportunity to compare the output of not using the VOS-model including the area which has not been considered, and the benefit of using the model.

7.2 Course and Module creation improvement project

7.2.1 Background & purpose

The project started with the aim of looking at how the Coventry University can best use its course related data both in terms of offering the most effective information to customers and ensuring that the same data can be reused to reduce elements of duplication and re-input.

The course and module creation service improvement is an operational management improvement, which covers the execution of the new course and module creation.

7.2.2 Summary of the VOS-model implementation on Course and Module creation project

The VOS-model is implemented into the project in detail in chapter 6 (Appendix 19). The application of the VOS-model was simultaneous with the subsequent delivery stage, in which the development of the solution was being worked on between ITS and Registry Office.

7.2.3 VOS model Validation in Course and Module creation project

The proposed solution which ITS was working with Registry office on, was to automate the data input from Registry Office into the central data holding system (UNIVERSE) i.e. to automate part of the current process within the service to improve the efficiency. Registry Office had been selected by the project initiators as the key stakeholder who was assumed to know the current process and documents, well. This information was learned from asking project team as a set of starting questions:

Questions	Project team answers
What is the service you are improving?	Course and module creation service
Who are the stakeholders of this service?	Registry Office, Faculties and ITS
Have stakeholders expectation been gathered?	Had meetings with the Registry Office to understand the process and map the current state, the other stakeholders will be informed after the change implemented in the system.
How did you come to the solution for improvement?	By EA (Enterprise Architecture) mapping of the current process and system of the service (Refer to Appendix19.7for EA diagram of the current state).

Table 7.1 Course and module creation project team initial interview

As the answers showed, the approach for improvement were through same approach as current Lean implementation in HE-Service that was reviewed in Chapter 2 and 4, i.e. developing a solution by only considering selected stakeholder through mapping the process and removing the waste towards a more efficient isolated function within the service, while planning to communicate the implemented improvement with other stakeholders at the end of the project.

- Objective 1, To establish a methodology in order to represent all stakeholders to an improvement project;
- Objective 2, To develop a methodology to determine the importance of stakeholder requirements and their relative importance.

Applying the VOS-model represented all the stakeholders of the service who have not been involved, as well as the classification of the stakeholder (refer to Appendix 19) and showed that Academics are the SP, and QAA and Prospect customers the SR, while none had been involved in the project.

Selecting the stakeholders of the service, in the pre-project phase not only helps on hearing their voice but also it helps in receiving better support from the stakeholder at the start, while facilitating the resource planning in project initiation stage.

Using the one-to-one meetings and group meetings with the presented stakeholders (for JISC and QAA, their communicated policy in place was used to list the attributes) recorded as a new set of requirements which has not been considered initially by the project originators/manager. Academics were the one who as the SP, were struggling the most in delivering on-time. Not having a clear picture, it was assumed that the Registry Office (RO) is spending a large amount of time in chasing Academic input. Therefore automating the process was selected for RO to make the process efficient and remove the chasing action as a waste in the process.

The main reason why the project initiators did not involve all the stakeholders was stated to be the increasing list of expectations which adds complexity to the project. Not having a method in place to deal with multi-stakeholder expectations which are confusing and complex. In Course and Module creation improvement project dealing with 13 stakeholders and 101 expectations seemed to be too much to deal with by the improvement team, when the data was shared. Using the VOS-model stages from representing the stakeholders to gathering the attributes from stakeholders, and quantifying, narrowing down the attributes and reviewing the alignment removed the complexity from the data. The review showed the 62 attributes are aligned, with no tension between them, and the attributes with the highest importance from 101 reduced to 11, as a result of the application of the VOS methodology.

- Objective 3, To develop a means of specifying the value desired by each stakeholder;
- Objective 4, To design and test a methodology that is able to inform an improvement project such that the project outcomes are aligned to stakeholder requirements.

The result was a manageable list of expectations which included all the stakeholders' voice (Refer to Appendix 19.2). The areas that have been highlighted in VOS were:

- A marketable course/module
- Delivery of the project within the expected time frame
- Interoperability between system to reduce input duplication
- Streamlined visible process
- Link between enrolment system and course/module documents
- Data quality
- Clear communication channel between marketing team and other stakeholders and mainly academics
- The involvement of business in designing the content
- Marketing advise for the course/module at the start
- Knowledge level
- Aiming at attracting a wider customer

Within the specified VOS list, none had been considered in developing the initial solution in the improvement project. However, it can be argued that automation of data input from RO to UNIVERSE system can be classified in the 'streamlined visible process', but in the bigger picture the progress of course approval is required to be communicated to academics, marketing, and faculties. Therefore the offered solution will help the registry to put the data in the central system, while they still need to communicate the progress with each other.

The KANO model was used to classify the VOS, based on their impact to the business. This was required to evaluate the current situation of the service against the quantified VOS based on business performance. The output was a prioritised balanced VOS; - 5 fundamental, 5 better to have, and 1 delighter. (Refer to Appendix19.2)

It was at this stage that it was established that the involvement of stakeholders is critical to the success of effective improvement, as within the Fundamental category, there is VOS from AIS, and SP, and in addition in second category there is VOS from AIS, and SR. The Fundamental areas i.e. marketable course, visible streamline process, business involvement in designing a course/module, link between system and course/module document none has been covered in the proposed solution, which could demonstrate the low stakeholder satisfaction by implementing the solution as an improvement to the service.

To have a better guide for moving forward on improvement based on the VOS-model it was required to evolve the classified VOS to Value-drivers for the service. This was done by involvement of SP, going through the 11 balanced VOS, by questioning what the issue is in the current state of the service, and for delivering the VOS for what it is required. While the knowledge of SP in knowing the process and documentation and characteristic of the service is used in this stage, the management and Lean knowledge of the researcher as the VOS-model initiator has been used as well for developing Value-drivers (Refer to Appendix 19.3 for the list of Value-drivers).

Requiring the understanding of the current state, the joint Swimlane and Service Blueprint was used as a method for mapping the current state, by adding the stream of output, stakeholders and Value to the map. By doing so, it was possible to visual the actual out-put of each phase of the process, the stakeholders who were involved in that phase and the value-drivers which fitted in that phase. This reduced the complexity of comparing the current state of the service with expected future output, while included the value-driver of the service as a guide (Refer to Appendix 19.5 and figure6.26).

Considering Actual-output of each phase and the value-drivers mapped against each phase a judgmental expected output was developed. In this case for:

- Draft documentation stage; the expected output was worded as 'marketable, joint business-academic, new program proposal for a specific audience'
- Stage 1,2,3; the expected output was worded as 'streamlined process with interoperable systems and reliable data'
- Stage 4; the expected output was worded as 'Clear marketing strategy (i.e. audience, method, and time) with reliable enrolment system'.

- Objective 5, To determine the utility of this methodology in improving stakeholder satisfaction with project outcomes.

The result of the VOS-model implementation, highlighted for the project manager that the range of stakeholders were not understood from the beginning and the initial proposed solution was not aligned with the value-drivers. The project manager specified in his feedback that; *"the VOS-model was helpful to understand and remove the complexity of the stakeholder range of requirements. The project had to be stopped in the development phase as it was realised the proposed solution will not be able to deliver the effective service improvement. The lesson learnt are that we will be open to use any analysis that makes sure we are on track"*.

The development of the automated system for Registry Office was stopped, as it was apparent the initial proposed solution for improvement was not aligned with stakeholder requirements,

meanwhile, because of the time and funds that had been already invested, the project had to be put in pipeline for availability of resource and new fund.

In summary;

- The need for the model to enable dealing with multi-stakeholder expectations (13 stakeholders- 101 expectations); by using the VOS-model stages i.e. representing stakeholders, eliciting/gathering expectations, narrowing down the expectation and reviewing the alignments, the complexity became manageable;
- The benefit of using the model in this project was providing a guidance on realisation of the problem, expectation and value towards the effective service delivery for all stakeholders;
- Solution; A manageable list of expectation which included all the stakeholders' voice.

7.3 HESA report project improvement

7.3.1 Background & Purpose

The project has been raised based on the requirements Planning Office have for reporting on changes made to the student records after the lockdown period. The lockdown period is agreed between the Faculties and Planning Office, after which any changes made to student records, should be reported to the Planning office by the nominated member in the faculties (mostly Faculty Registrars). This is what had been put in place as an improvement to the service previously.

Planning office (PO) requires reporting on 151 fields (Refer to appendix 20 for a list of the Fields), in which 42% of the fields were categorised as common changes within the records reported to HESA (Higher Education Statistics Agency) containing the data related to the student's record. From the beginning of August, PO lockdown for compiling the reports to be submitted to HESA beginning of October. The report is on the data from previous academic year by the PO. Once data collection has started for the annual 'HESA return', it is important that specific aspects of the data are not changed by other administrative staff within the University. As the PO relies on faculty to flag records which have been amended, sometimes this information is not passed by faculties or is flagged very late. This causes issues in the quality of data that PO has to provide HESA. As a result PO has to amend the records and then go through the quality checks again and resubmit the data. The aim of this project seeks to give PO increased awareness of changes to reported data. (refer to Appendix 20.1 for project scope).

The HESA report improvement project is a tactical management improvement, which covers the procedure on 'how' to improve on HESA report data quality.

7.3.2 Summary of the VOS-model implementation to HESA report project

The implementation of the VOS-model was done on pre-project phase. A key part of the PO's activities is the reporting of student-related data to organisations within national government. One such organisation is HESA. It was decided by the management team that the area requiring attention for improvement is the HESA report produced from the "Student record" as it does have a direct impact on getting funding, data published for academic researcher, students, prospective students, attracting the private companies, professional bodies and the press and media. The service range provided by PO within the 'Student record' area is collected based on the meeting with Principal Planning Officer (refer to appendix 20.2 for Service-range and stakeholders matrix).

The selection of the service which requires the most attention between the range of services provided by PO on Student Record done by using the Boston Matrix (refer to appendix 20.2 for the service range impact-effort evaluation). 'HESA' report and 'Confirmation and Clearing Monitoring' was selected as low effort with high impact for the business based on the current situation. Between these two services because of the time scale and the over projecting of delivery, HESA was selected for improvement.

Based on VOS-model stakeholder category classification, the stakeholders have been classified to:

- A. SP (Service Provider);- Planning Office (PO)
- B. Service Receiver (SR);- HESA
- C. Affected/Interested Stakeholder (AIS);- Vice-Chancellor group (VC), Senior Management, HLS Faculty, AD Faculty, BES Faculty, ACCUA, National/International Students, Audit Committee and Standing committee of chairs, Academic, Registry, IO, IT, HR-Academic program coordinator.

PO is selected as SP because they are the service owner and responsible for providing the ultimate service to the SR, as well as the one who decides about the changes to be made. HESA has been appointed as SR or ultimate customer, as they are the one who approve the HESA report, i.e. if they are not satisfied the ultimate service will require reworking. In this case the service needs to fit in the regulation set by HESA.

Knowing the stakeholder list, prior planning for any improvement on the project, helped to work on value co-creation from the start. By arranging one-to-one meeting on developing what is desired from the Service by each stakeholder the attributes were captured. Prior to the meeting a short email was sent out, part of it underlined '...as you are stakeholder within this service, it is helpful to know what would be your expectation and whether you will gain any benefit on increasing awareness of changes'. (Refer to appendix 20.2).

A positive reply was received by all stakeholders, except BES faculty, IO and Registry. The meeting started with a short description on introduction to the project and its aim. The meeting within Faculties was all set with Faculty Registrars who were the point of contact between Faculties and PO. The standard set of question was designed in order to understand their input while asking about their expectation:

- a) What is the process of informing PO in place from your faculty? How do you inform them?
How do you get informed by staff of changes made?
- b) Why do changes happen?
- c) Why the information is passed late or not passed at all in some cases?
- d) What are your expectations to facilitate the process for better ultimate service to HESA?

Collecting the expectation helped to build up details from different stakeholder perspective to identify value-drivers. There were attributes which were aligned with each other (Refer to appendix 20.2 stage 4 for detailed matrix) for instance attribute A1 which been in the interest of AIS (Affected/Interested stakeholders), SR (Service Receiver), and SP (Service Provider). Attribute A1 “Quality, reliable data”, is specified by the Vice-Chancellor, senior management, HESA, EC faculty, Academic and PO. Having a similar expectation demonstrates the specified stakeholders involved in delivering the service have the same aim as SP, and they are all expected to work toward the same purpose.

Attribute C1, is provided by HESA as “Reliable data for processing and providing information to UK government and HE funding bodies”. The attribute is specified clearly in set regulation by HESA.

Attribute D1, is provided by HLS faculty registrar, as “Something tangible which we can analyse the changes made on data to reduce these changes”. Currently there is no way to back track the changes, it is not possible to analysis the reason, when, and by whom the changes being made. Have they been authorised? Is there any trend on changes? Having a required data in place would help to reduce any non-required variation in the process.

Attributes E1, and E2 are specified by the Art and Design Faculty registrar, as “A report which clearly indicates changes from A to B”, and “Planning office to clearly define fields which need to be communicated on changes made”. E1 mentioned as staff within the faculty amend student records, and especially during the peak-time (registration) not all changes are communicated. Therefore, faculty registrars are not able to communicate all the changes made to the records. E2, mentioned as not being sure exactly what fields within UNIVERSE (central data holding system) get reported to HESA so that any amendment is reported against them. Attribute G1, “A report which indicates the changes from A to B”, G2, “Option to filter within the report for relevant fields”, and G3, “Provide a better understanding of instance for faculty registrars” mentioned by Engineering and Computing

(EC) faculty registrars. Attribute H1, “Planning Office to clearly define which fields we are allowed to change without confirmation”, H2, “Eliminate human errors on not reporting cases”, and H3, “A system in place to hold information regarding changes to review changes annually”, mentioned by ACUA. National and International students requested attributes as J1, “Flexibility to apply for request on changing module, courses” as well as J2, “Keeping accurate data on my student record”. Audit committee mentioned K1 attribute as “Providing accurate data” as their main expectation. Academic mentioned L1 “Flexibility to update any changes within academic year”, and L2 “Allow to change courses offered within the academic year”. IT raised the point for O1 “Auditing system which UNIVERSE can accommodate”, while HR-Academic program coordinator mentioned P1 “A communication system which can accommodate the changes because of the nature of courses we offer”, which was stated further as the variability offered for the participant. Planning Office (PO) has expectations as I1, “Notify us on all the changes made on UNIVERSE fields which is reported to HESA”, and I2, “Current accurate communication on all the changes and updates”.

As mentioned earlier, the Business Faculty (BES), Registry and IO did not reply to the request for a meeting, to make sure they are happy with the decision made, later in the project an email was sent out with a deadline to reply if they are not happy about the solution for improvement.

Among all the mentioned attributes by the stakeholders, a set of the most important ones was selected by each stakeholder, as VOS. This is done through asking each stakeholder to select the most important attributes between the ones they mentioned through using a pairwise comparison matrix (Refer to appendix 20.2 stage5). The VOS was reviewed by SP to classify them against the business performance need (refer to appendix 20.2 stage 6).

The prioritised VOS evolved to Value-drivers with involvement of SP. The review of the current output after lockdown, considering the value-drivers, formed the expected output.

7.3.3 VOS model Validation in HESA report project

Simultaneous with PO requesting and selecting the HESA report service for improvement, they asked also for development of the solution which they came up with. The solution was informing PO with an automated notification on any changes made in UNIVERSE fields which is reported to HESA.

This is when the previous proposed solution by PO, in place for a year, i.e. lockdown period did not deliver PO’s expectation. . The current approach fails to capture the changes when and where it happens, and it does not offer any control and tracing- back opportunity. It does not highlight the variation between the PO holding data and the updated data in UNIVERSE.

The set research objective was delivered in testing the VOS model in HESA report project:

- Objective 1, To establish a methodology in order to represent all stakeholders to an improvement project;
- Objective 2, To develop a methodology to determine the importance of the stakeholder requirements and their relative importance;
- Objective 3, To develop a means of specifying the value desired by each stakeholder;
- Objective 4, To design and test a methodology that is able to inform an improvement project such that the project outcomes are aligned to stakeholder requirements.

By using the VOS-model, a better understanding of the situation was envisaged. VOS-model helped:

- To envisage how can stakeholders work on value co-creation for a more accurate data;
- A requirement list for improvement by all the faculties, in order to be able to handle the issue in a holistic way, to be able to look at the other side of the spectrum as well;
- The design of solution is made around value-drivers developed from stakeholder expectation for a holistic, and effective improvement;
- Involvement and two-way communication; Increased awareness of changes required to be reported to the Planning Office, while the requirements from providers of the data being communicated and considered;
- The benefit of using the model was a wider improvement and visibility within the university by offering the control to stakeholders for a better understanding on student record changes;
- Plan for improvement was made based on the delivery of Fundamental value-drivers, for phase one, and was given a time frame of 6months to be developed, tested and reviewed before moving to the second phase of improvement in offering greater flexibility;
 - The first phase; put in place an auditing system to get a better understanding of the changes made. Because of not having a system/standard process in place to control the changes made within each faculty, it is hard for them to track any changes. And as they will not know all the changes made across the Faculty, they will not be able to communicate it to the PO. The reasons for making changes are mainly because of offering flexibility to students to change module and courses, as well as human error in inputting data, and not having clear communication between all the staffs who have access to UNIVERSE. Not having control within faculties over the changes highlighted the requirement for first instance to have a system in place which can identify the changes made. This would allow faculties to review in more details the reason and ranges of the change been made. So that the right decision can be made based on data for eliminating the variation.
 - The second Phase; after putting the first phase in place, the project can start the next phase of eliminating the offered non-required variation and in result reduces the

number of changes. On the other hand PO would be able to make a clear list of changes which Faculties need to communicate/confirm with the Planning Office on. With the use of data auditing techniques it is envisaged that PO will be able to not only identify changes to data, but also who has changed the data. This is not to find blame but for finding the requirement for training.

- Objective 5, To determine the utility of this methodology in improving stakeholder satisfaction with project outcomes.

Feedback from the project team and stakeholders on the utility of the VOS-model indicated:

- ✓ Business Analyst Lead; *'the VOS-model was useful in putting things in place. It helped analysing the service easier by knowing the agreed value-drivers. The method was different from the approach we had in establishing the role of stakeholders, but by the end of the model application the benefit started to be realised, and we started to use the model for coming projects'.*
- ✓ Project Manager; *'there was a need for a method to articulate the views before the initiation stage, for being focused on improvement direction. Delivery of the solution was split into two development phases, and the stakeholder appreciated and supported the output as it was communicated to them the reasoning behind why it could not be delivered in one phase.'*
- ✓ Planning Office (SP); *'it was really useful, the involvement, communication and being notified in regular meetings and updates. Initially our expectation was a development of a report on changes by IT, but by hearing the other side of the story from faculties with their expectations, a picture of wider benefits was developed.'*
- ✓ IT team; *'by dividing the expectation to different levels of priority, we were able to work on the solution in a more controlled and manageable time-frame. Making the report independent from staff/areas allowed us to remove the variation, and having to rely on human input.'*
- ✓ Faculty (ACUA); *'I was surprised to be involved into the project early on, as usually we get informed on what has been changed, but I was happy to communicate the issues we were facing at the moment. Even though, the expectation we mentioned (a system in place to hold information regarding changes to review changes annually) is not classified as fundamental and will not be delivered in first phase of improvement, we understood that the improvements in phase one will facilitate the delivery towards that.'*

The developed solution for phase one is in testing phase at this point, and the further development for phase two is planned already.

7.4 24/7 IT Service Support project

7.4.1 Background and purpose

As Coventry University continues to rise in the league table standings, IT Service's (ITS) play's its part by continuing to look at improving its quality of service. With more overseas partnership's, campuses and office's being planned, one of the major challenges ITS will face will be to provide IT Support outside of 'normal' UK working hours.

In addition, the 'old' model of standard academic delivery, in a predefined manner, is changing and to maintain the relevant levels of cover there is a need for all the support services to mirror the needs of the organisation and this is no different for ITS. This project set out to review the provision from staff perspective (Refer to appendix 21 for a detailed introduction to the project environment);

- Understand the current level of out of hours support that ITS provides to members of staff.
- Understand the business needs relating to out of hours IT support.
- Provide recommendation for ITS Senior Management, based on business needs to improve out of hours IT support.

The 24/7 support project, is a strategic management improvement, which covers the overall direction of the business in long term with the decision to be made by senior managers.

7.4.2 Summary of the VOS model implementation on 24/7 ITS Support project

IT support among the other out of hours service has been selected because of the requirement for the review of strategy to reflect the new situation with more overseas partnership's, campuses and office's being planned.

Based on the project scope the stakeholder range got listed and classified as:

- IEMS (International Experience and Mobility Service) got selected as SR
- APU (Academic Partnership Unit) as SR
- IO (International Office) as SR
- CUC (Coventry University College) as AIS
- Staffs as SR
- IT as SP
- Senior managements as AIS

Using the ground-tour technique the expectation captured from the stakeholders and the shared interest were gathered in the same matrix. The weighting method used for quantifying VOS between the listed attributes. The VOS-model initiator and the SP worked on the trade-off between business performance and VOS, to balance and prioritise the VOS (refer to Appendix 21.1 stage 6).

Based on the prioritised VOS and reviewing them against issues and requirements a set of Value-drivers was developed, ready for comparing them with actual output of current ITS support (refer to Appendix 21.1 stage 7). The actual output was 'reactive, un-tracked IT support within working hours' when it was compared with Value-drivers and the gap became more clear and the expected output was developed as 'pro-active traceable IT Support, with highly reliable systems and infrastructure for all the overseas and UK offices' (refer to Appendix 21.1 stage 8).

7.4.3 VOS model Validation in 24/7 ITS support project

The VOS-model was used to study the feasibility of the new proposed direction of the ITS support. Meanwhile, as the 24/7 support required a budget to be approved the senior management team needed to provide a solid analytical case to the Deputy VC.

The VOS model practice on 24/7 project demonstrated the delivery of research objectives by (objective 1) representing all the stakeholders; 7 stakeholders, to the improvement project, (objective 2) while determining the importance of stakeholder requirements and their relative importance, (objective 3) specifying the value desired by each stakeholder which (objective 4) had direct impact on the project outcome decision for improvement. The agreement the project team reached after the value-drivers review were:

1. Reporting systems on system failure are already in place 24/7, however the issue will be picked up in next UK working day
2. The main issue for Delhi is speed rather than out of UK working hours
3. To be more proactive and in control of the issues, ITS require a management tool, e.g. SCSM (System Centre Service Manage) to track the issues
4. ITS issues assessments prioritisation has been designed isolated from academic milestones and business need
5. Streamlining the service process is required prior to extending the hours

As a result of gaining knowledge about the current state of the service and the value-drivers, the project team was able to plan the outcome aligned with stakeholders' requirements. The new project was launched for configuring SCSM (System Centre Service Manage) system within ITS

service desk. One of its main aims is an implementation of SCSM with the report module so proper analysis can be carried out. This would help to make an informed decision moving towards a 24-hour support model.

Parallel to the mentioned project, a second project was launch looking in details on expectations mentioned by International Office (IO), a business analyst allocated to reviewing the problems and travelling to India (Delhi) to consult with the stakeholder.

Having a clear set of value-drivers by using the VOS model, guided the project team toward a decision for an effective improvement and highlighted at this point in time that there is not enough evidence for 24/7 IT support service. But as other business units may consider to offer out of hours support in the near future then ITS will also need to consider these areas and the requirement for IT support and keep the idea under consideration and continuous review.

Feedback from the project team and stakeholders on the utility of the VOS-model indicated improvement in stakeholders' satisfaction with the project outcome:

- ✓ APU feedback; *'Things had been changed before as an improvement projects for instance, in UNIVERSE for SAB and PAB, as we have not been involved in the development of the change, the improvement does not work for us and it doubled our workload. It is positive that in this project we have been involved from the beginning.'*
- ✓ IO-Dehli Office; *' The delay because of current infrastructure, has huge impact on the speed we can process the applications and our efficiency, being able to bring this to management attention so that we get the problem solved rather than receiving 24/7 support is really useful for us and the University. Because that's where we were struggling the most'.*
- ✓ Senior Manager; *'The result was different from what we were thinking & highlighted things that the department required considering. We are trying to move from system application delivery to service delivery, and so we need to manage services better. The VOS-model helped us to understand what customer/stakeholder wanted, and made us to look at it. Two new projects already launched to deliver the expectation'.*
- ✓ Project manager; *'Improved stakeholder response and support.'*

The VOS-model established its utility in this strategic project, by guiding the senior management team and project team. It improved the stakeholders' satisfaction by involving them from the start as well as considering and acting on their expectation for improvement of a more effective service.

7.5 Student information report data quality improvement project

7.5.1 Background & Purpose

In 2011-12, 2800 records related to Home/Term-time postcode (PC) were amended due to poor quality data held in the system. The Planning Office (AR) had to manually search for correct postcodes and manually undertake updates for reporting purposes.

The errors that occur are either 'Structural' or 'Logical'. The Logical errors are the ones based on HESA rules. The 2011-2012 data identifies 28% of structural errors and 70% logical errors, of these 32% of errors are "invalid postcode in entry", and 52% of the logical errors are identified as "the student TT PC are the same as their Home PC on entry where their Term-time (TT) accommodation code is "other rented accommodation" i.e. almost certainly different.

A variety of system and input routes are identified linked to this process and as such need to be reviewed these include SOLAR, iApply, RoomService.Net (RSN)-UNIVERSE linkage. SOLAR and iApply (as shown in Figure 7.2) works as an input route for the core data holder i.e. "UNIVERSE". RSN imports data from UNIVERSE as well as holding current TT data, where the accommodation belongs to the university, although this is not currently passed back (refer to Appendix 22).

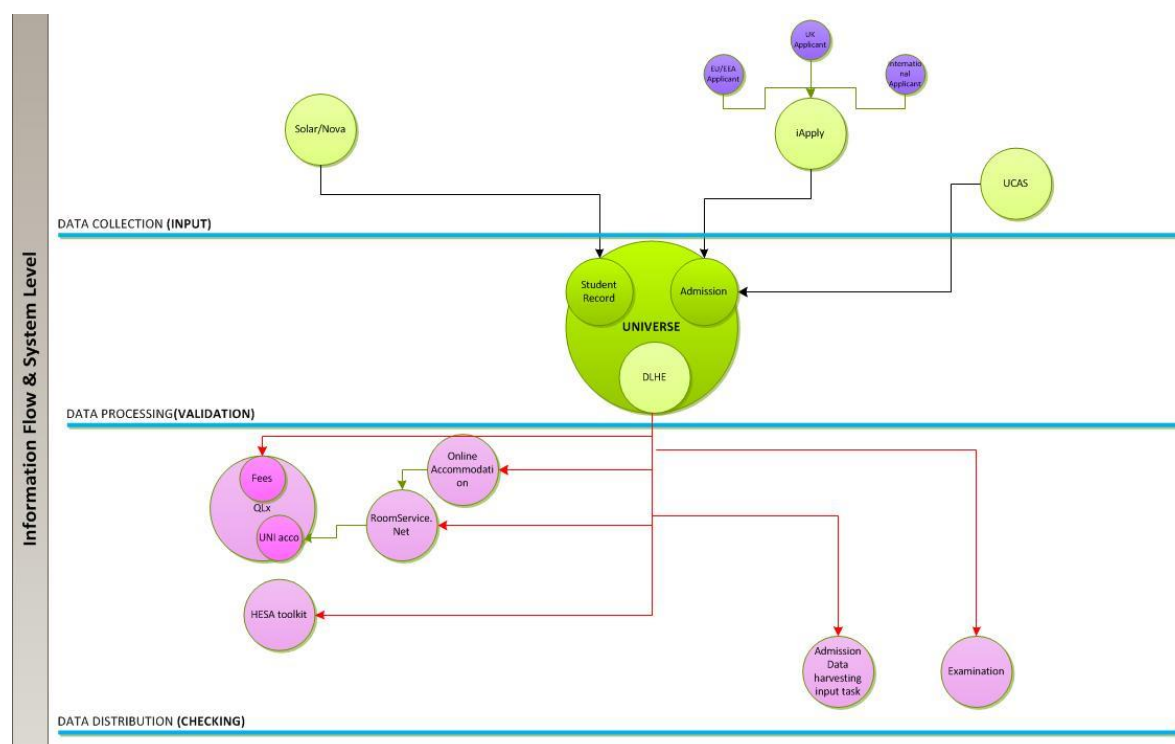


Figure 7.2 Information flow between current systems

The aim of the project is to minimise the errors related to Home/Term-Time (TT) and Correspondence postcode to improve the data quality. In case of the scope of the project, the report considers, in general, the issues associated with the Students' PC data quality for both UK/EU and International students are in terms of:

- Home address; UK students
- Term-time address; UK and International Students, except the distance learner
- Correspondence address; UK and International

The PC data quality-improvement is a tactical management improvement, which covers the 'how' to improve and the procedure on student address data quality for HESA report.

7.5.2 Summary of the VOS-model implementation on student information (address) data quality improvement project

The VOS-model was applied in pre-project phase, even though convincing the project manager was not easy as the assumption was that the ultimate solution as 'quality data' is clear and all the stakeholder will naturally agree on that, therefore no additional time on double checking the expectation is required.

The Student information report was selected as the service for improvement in the area that the university is holding information on Student address (refer to Appendix 22.1 for all the VOS-model stages). Based on the service stakeholders range was listed and classified:

- AIS; IO, Registry/ Faculty registrar, Student, Tier4 Compliance, Finance, and Accommodation office
- SP; Planning Office
- SR; HESA

Face-to-face meetings were conducted for gathering the expectation from the stakeholder. For students, in addition an introduction on HESA and the reason their information is used in reporting to HESA had been delivered, prior to capturing their expectation. And for HESA, the rules specified on their guidance were used as their ultimate expectation.

In gathering the expectation (refer to Appendix 22.1 stage 4), to select the VOS, the weighting method was used by each stakeholder. Then the VOS was balanced and prioritised by involvement of SP.

In developing the Value-drivers even though the base of all expectation was a reliable quality address, it was mentioned by different stakeholder that different systems and aspect of data such as input, processing, and distribution level needs to be considered.

For instance B8; 'Quality of information input by students need to be controlled as currently it is really poor'. Highlighted the fact that SOLAR and iApply accepts any data as PC and address, which led on having Value-driver as 'Improving the data input by removing the entry errors in SOLAR and iApply'.

In C1 'User -friendly system in place to facilitate the process of providing the personal contact information' by reviewing the issues and requirement the value-driver was structured as 'User-friendly SOLAR and iApply by accommodating auto-fill and standard fields in place to facilitate the process of providing the personal contact info'.

Knowing the value-drivers, the gap between the actual output from each stage in application phase, enrolment, term-time and post term-time phase, was reviewed for developing the expected output from the service. Swimlane and EA diagrams were used to understand the information flow between the systems within the phases (refer to Appendix 22.1 stage 8).

Having understood the gap, by considering the value-drivers set of actions and requirements for fulfilling the expectation towards the effective improvement were made in detail as was the solution by the improvement project team (refer to Appendix 22.2). The report included the details of solution with keeping the value-drivers as a guidance to optimise the service effectiveness by meeting the stakeholders need.

7.5.3 VOS model Validation in student information report data quality project

While this project has multiple-stakeholders (8 stakeholders) same as the previous cases, but the range of expectation (35 requirements) was greatly aligned, and in result application of the VOS-model took less time to go through stage 2, 3 and 4. This was envisaged by using the VOS model which enabled the representation of all stakeholders (objective 1) followed by determining the importance (objective 2) of the stakeholder requirements and their relative importance.

Capturing the stakeholder expectations (objective 3) helped to clarify 'how' the improvement can be delivered not only 'what' needs to be delivered. Even though all the stakeholders expected 'reliable, quality data' they mentioned that this was the area where they have been struggling to identify the expected attributes to be in place for an effective delivery of the ultimate service.

Application of the VOS-model established beneficial, as the value-drivers developed from VOS made the improvement and the opportunity for improvement areas more visible by working as the navigation towards developing the solution. The original assumption was that improving the HESA report data quality would help only Planning Office, but the VOS-model established the quality data has a wider impact on delivering overall organisation benefit, and the improvement can be guided towards delivering these benefits for all the stakeholders (objective 4). While the general assumption of 'quality data' as a primarily solution without using the VOS-model did not embrace this wider view.

The improvement delivered Planning Office (AR) benefits of:

- 396 hours saved over a 7.5 month period amending PC data, equivalent to £5k- £7k PA;
- Improved data accuracy for HESA which impacts on both funding and University Ranking
- More user-friendly layout for student inputting data in web base systems
- Accurate business requirements for IT development team (refer to appendix 22.2 for the report)

Holding accurate reliable data benefits all areas of the University involved in posted correspondence, i.e. Registry, Accommodation Office, and Tier4 Compliance team while poorly addressed correspondence impacts on the customers' observation of the organisation.

Feedback from the project team and stakeholders on the utility of the VOS-model (objective 5) indicated:

- ✓ Project manager; *'The project highlighted the problem we have in data management and the fact that we do not have control over the quality of data. By using the VOS-model, a number of solutions were identified, via presenting enough material to make the right choice. The detailed provided in balanced collected expectations from the stakeholders, helped to develop the specification for making the codes spot on for development team.'*
- ✓ Planning Office; *'The solution is the best package we could end up with.'*
- ✓ Business Analyst; *'By using the VOS-model, the quality of capturing and managing stakeholder requirements improved. The stakeholders were in agreement with service value-drivers from the start of the project and that not only increased the stakeholder interest and satisfaction from the improvement but enabled a better support from them. New ideas and suggestion, through the meetings for collecting expectations, and raising the existing or emerging needs were communicated which helped the development of solution.'*
- ✓ Registry; *'There was a need for the improvement but we did not have the chance to raise the need for it. The correspondence address could be left blank by students as there was no*

checking mechanism in place, contacting students in case of them not being enrolled or when we needed to send documents to them was the area we were struggling the most. Using the VOS-model was helpful, as it meant our requirement could be considered within the development of the solution and removed a failure point in service delivery.'

- ✓ Accommodation; *'using the VOS-model and including us in the project meant we were able to express our expectations, and put things in place. The solution for sharing the data which was already sat in system with PO reduced the time and resource we had to allocate for reporting to PO.'*

7.6 IT Asset Management (ITAM) service improvement project

7.6.1 Background & Purpose

The project has been raised based on the requirements ITS have to select an appropriate system which is capable of managing IT asset, i.e. software and hardware.

The current method in place for managing assets is mainly manual with information stored on spread sheets. As IT Local Delivery (LD) relies on different staff across the university to update and gather data, the management of assets is complicated. This causes issues in the quality of data held as well as the ability to produce effective reliable management information required by stakeholders for making strategic and operational decisions.

IT has raised the need for managing the asset in more effective way over past 7 years with the Head of IT and improvement project manager team, and recently by structural change within faculties and centralisation of LD (i.e. moving the technical team out of Faculties) Faculties, Head of IT and other stakeholders have started to see the need too. But as the service spreads across the university the challenge to overcome the complexity always stopped the progression, and small changes on making the service works have instead been applied, which has led to greater variation of process and forms, and lack of visibility of the whole process.

Hence a decision has been made to investigate the need for implementation of a 'system' to facilitate this work by assessing requirements of all relevant areas of the business linked to SAM (Software Asset Management) and HAM (Hardware Asset Management), to aid the selection of a fit for purpose solution.

The ITAM project improvement is a tactical and operational management improvement, which covers the 'how' to improve i.e. the procedure as well as execution of asset management service.

7.6.2 Summary of the VOS model implementation on ITAM project

Within the range of service provided by IT (refer to Appendix 17), SAM and HAM were selected by senior management based on years of demand raising request from IT staffs. The stakeholder were represented by meeting with IT senior manager (refer to Appendix 23).

The requirements were captured across the university from IT-LD, BES Faculty (Finance), EC, IT-Security, CULC (Coventry University London Campus), IT-BP (Business Partners), HLS Faculty, BES Faculty, BES LEU (Learning Enhancement Unit), AD Faculty, and Procurement. Post meeting and interview with the stakeholder (refer to Appendix 23, stage 4), a list of expectation from the stakeholders was gathered and listed in the matrix, which included Software and Hardware as well as the general expectations from the service. At that point the project board decided to carry out the project in the two separate parts of SAM and HAM respectively, and the priority was given to SAM, as the process and the characteristic of the assets (i.e. hardware or software) were different.

In order to cover any interaction between the two types of the assets, the general expectation which covered both types were left to be considered in both SAM and HAM.

The 134 SAM-requirements were quantified to 23 requirements, by selecting the key attributes in a standard way across the stakeholders through using pairwise comparison. The analysis and review of the pairwise comparison table showed the ultimate stakeholders preference as well as mixture of attributes graded with same importance. For example:

- BES Faculty gave B3 (report on age, location and % of usage and specification) the same priority as D3 (Being able to export report data into MS Excel format) and D1(visible/accurate lifespan asset management data)
- AD gave F1 (Establish a standard process) the same priority as H2 (Reduction in the manual interaction)
- Procurement manager gave; A33(Ability to integrate with finance system) the same priority as F1(Establish a standard process)

Following the quantification of the attributes to key attributes i.e. VOS, balanced and prioritised against the business performance to the three main categories was done by the SP (IT-LD) and project team, in which those attributes that delighted were highlighted as exceeding needs from the service, such as:

- Future plan for managing asset
- Plan for future available development options

- Analysis of comparative costs on options for better decision to be made

The prioritised requirements were mapped against CTS, for understanding the attributes in technical term and identifying the value-drivers (refer to Appendix 23, stage 7). For example:

- A20 (Ability to track the different version of a software), the issue behind this expectation being highlighted as; 'sometimes we do not know if we have got the most updated software, it also highlights support requirements and issues', while the requirement to deliver the expectation was mentioned as; 'A searchable data base of information with reporting capabilities'. Considering the VOS, Issue and Requirement the Value-driver was identified as, 'A searchable data base of software licence information with ability to track software licence information and reporting capability'.
- A19 (Ability to store basic information about the software such as requestor, purpose, number of license etc.), the issue is, 'cannot track past history of purchases', the requirement will be, 'ability to keep historic data and use it', resulting in the value-driver being set as 'Ability to keep historic data about software such as; requestor, purpose, number of licences, etc.'

Having set the value-drivers the gap between the current and expected state of the service was studied. While the current state was mapped, the value-drivers were mapped against the current process phases of service. The service was highlighted to go through the 6 phases of:

- Decision state
- Procurement management stage
- Deploy stage
- Maintain stage
- Support stage
- Retirement and Disposal stage (refer to Appendix 23, stage 8).

The value-drivers highlighted that the gap cannot be filled only by purchasing of an ITAM system, as the requirement towards the expected improved service are in four main categories of:

- ITAM system requirements
- Compatibility of ITAM system with the systems currently in use
- Process and input standardisation
- Emerging requirements

The potential benefit of the improvement project is realised as having a greater impact across the university. In order to deliver the service effectively, there are areas therefore that also require improvement such as agreement across the university on process and input standardisation, compatibility between the various systems, and the level of details required to be held in ITAM system.

7.6.3 VOS model Validation in SAM project

The project contained a greater level of complexity compared to other cases, having the service spread to wider areas of the university, while the gap between the 'current state' of the service with 'expected effective service' was greater as well. Additionally it also highlighted the need for service improvement in different levels i.e. operational (standardisation of the process, coding), Tactical (compatibility of the systems and processes, new system requirements), and Strategic (Service level agreement on emerging requirements). The project has both tactical and strategic consideration for senior managers as well as a day to day operational element for other stakeholders.

Representing all the stakeholders for the service (objective 1), and determining the importance of their requirements (objective 2), while specifying the value desired by each stakeholder (objective 3), communicated the effective improvement on the service requires to pay attention to the improvement in the system in use, process standardisation and compatibility between the systems (objective 4). Using VOS model not only provided a method to capture the existing requirements for improvement, but also the exceeding expectation classified as delighters was highlighted, to be consider for the future plan for improvement.

Feedback from the project team and stakeholders on the utility of the VOS-model indicated:

- ✓ AD Faculty; *'We have been trying to make a way to deliver the service around the current process, even if the team meeting were in place for communications but for ultimate decision our expectation was not considered in past few years especially after the centralisation. That made me to design a spread sheets and hold / update AD assets information for the faculty rather than chasing IT for it. There was a need for a way to make us able not only to explain the requirements but also a way to keep our expectation live within the development of solution throughout the project. The VOS-model showed the expectation we mentioned has been considered.'*
- ✓ LD (Support team); *'The service has been managed based on the managers' knowledge rather than a central accessible system for everyone. The VOS-model is useful to show to*

senior manager the real need for the improvement is not only adding another system, but there are requirements which the system need to cover. That will help a wiser selection of the system.'

- ✓ *Project Manager; 'By using the VOS-model, the project became much easier to understand and gave us a clearer picture for making decision.'*
- ✓ *BES Faculty –Finance; 'A model towards understanding a real problem and expectation to develop a solution, will make a real improvement by understanding all the chasing and uncertainty we have to deal with at the moment. This project with using the model/method for articulating our expectation from early stage defiantly will be able to end up with a better result for everyone.'*
- ✓ *Change manager; ' The VOS-model showed its utility by bringing us a better holistic understanding of the current service, and changed the approach of checking what system is available in market to be purchased for ITAM, to improvement towards an effective delivery of the service.'*

7.7 Summary

The five projects were selected to test the application of the VOS-model to differing types of improvement requirements i.e. Strategic, Tactical and Operational (as shown in table 7.2) and to improvement projects having differing associated levels of stakeholder complexities needing to be addressed.

VOS model as the established methodology, demonstrated its utility through representing all the stakeholders, specifying the value desired by each stakeholder, determining the importance of the stakeholder requirements, and informing the improvement project such that the project outcomes were aligned to stakeholder requirements.

The quantifiable project outcomes in each case demonstrated the utility of the model in the delivery of an improvement solution, while the qualitative stakeholder feedback confirmed the applicability of the VOS-model in the capture and representation of stakeholder requirement and value.

Projects	Improvement
Course and Module creation	Operational management improvement
HESA report	Tactical management improvement
24/7 IT Service Support	Strategic management improvement
Student information report, data-quality	Tactical management improvement
IT Asset Management Service	Operational and Tactical management improvement

Table 7.2 Validation cases

The applicability and utility of the VOS-model will be discussed in detail in the following chapter (chapter 8).

Discussion

8.1 Introduction

The previous chapter described the use of the VOS-model in 5 different improvement projects within the services provided at Coventry University. This chapter will discuss the relevance of the requirement for all stakeholders to be included in the process of improvement and the extent to which recognising and addressing their requirements is important to project success, and through an appraisal of the case-study improvement projects, discuss the utility of the VOS-model and thus demonstrate the degree to which the application or use of this may be considered generic.

In the current global competition climate, where any business must compete globally it becomes more obvious that service provider or firms are likely to be successful only to the level that they satisfy the needs of stakeholders. However, it becomes much harder to see where to act to deliver the greatest gains for the organisation and for its stakeholders.

The review of literature and observed cases showed that despite the emphasis made on providing value the urge remains to work forward from existing organisation knowledge to convince stakeholders that they want what the firm finds easiest to provide, thus the stakeholder voice is not clearly recognised in improvement projects.

Hence, no formal framework was discovered that attempts to capture all stakeholder expectations at the outset of project improvement for value realisation in Lean implementation in HE Service. Most of the reviewed framework used in HE improvement projects, start the Lean implementation by value stream mapping of the process, and while some specify the importance of stakeholder involvement for example they do not provide any formal process in identifying and managing multi-stakeholder expectations.

The most successful organisations are those that act as intelligent organisations able to receive information interpret it and translate it quickly and effectively into something of economic value, this is the operational core of Lean enterprise. The challenge start where not only the Voice of Customer (VOC) but in a more holistic approach Voice of Stakeholders (VOS) need to be taken into consideration for a sustainable improvement and in defining Value.

8.2 The importance of improvement projects in a Lean implementation

The review of Lean improvement cases within the public sector undertaken in detail in Chapter 2 showed that 'project improvement' has been used as a predominant driver to deliver business improvements regardless of the strategic or operational approach taken to the improvement.

Within project improvement the RIE or equivalent approach is the most common method utilised for Lean improvement, as a quick win can be achieved through delivering tangible benefit. However, that cannot be sustained unless C.I becomes an integral part of the organisation's culture, even if the RIE creates Performance Improvement (PI). Due to the limited level of impact it brings to the business it is a good starting point, but as Batmen (2007) indicated PI can only act as a foundation for C.I, and the Lean business improvement methodology needs to be considered as a long-term methodology.

In literature Martin (2012) suggests the habit of C.I can only be maintained through clear communication, ownership of improvement and management commitment, linking to organisational strategy. Universities as late adopters of Lean are some way from establishing a mature C.I culture, which is why perhaps the improvements made are more project-based through RIE or improvement projects. Staff Involvement in RIE or '-improvement'- projects could be expected to support the development of a C.I. culture within an organisation. And while this may not be the primary aim of these activities it is reasonable to anticipate that stakeholder involvement would engender the development of this culture over time. The VOS-model therefore provides the foundation and data required for any future improvement while, by involving stakeholders at the outset of the project it facilitates the clear communication, ownership of improvement, and management commitment to making decision based on real expectation, towards building a C.I. culture.

8.3 The significance of identifying all stakeholders in an improvement project

Within the Lean philosophy identifying customer value is the initial step in the principle. The potential clear difference between the manufacturing and HE service sector is the integral nature of customer engagement. In manufacturing it is the customer who pays for the product and defines the value. In the delivery of the service the provision of service and consumption of service take place simultaneously with customers being part of the activities for delivering the service.

It is important to address more than just processes within a Lean transformation in order to effect sustainable positive change (Bateman et al, 2007). As in the early days of Lean implementation in Manufacturing, which Womack and Jones (1996b) refers to as, “although many managers had grasped the power of individual Lean techniques- they had stumbled when it came to putting them all together into a coherent business system”. Lean in HE Service requires a more sustainable approach for implementation. There is a need to overcome the barriers to sustain Lean improvements over the longer term list by Radnor et al (2006) as:

- Manager’s lack of ownership
- Poor selection of improvement team members, i.e. wrong people becoming involved resulting in a lack of understanding the current situation and future requirements in particular areas of the organisation
- Some stakeholders being absent from the process and not reflected in the improvement outcome as they are not represented in the project

The transformation in Lean thinking from Lean manufacturing has built up the expectation for not only optimising one part of the process but the whole system by managing the value across and between organisations, Radnor (2010), specified that in order to deliver value across the organisation it is critical to involve people, who are an inherent part of the system delivering the service. These people who are an inherent part of the system for service delivery can be managers, staff, support staff, technical staff, but overall those who have input and interest in the delivery of the service, i.e. stakeholders.

On the other hand, for each service within the end-to-end improvement, managing value across the system, there are internal and external customers in the organisation. For instance, frontline staff are the customer of office staff, and back office staff are customer of downstream staff, who are all working on delivering service to external customers.

Therefore the initial step of the Lean thinking principle in HE service, is that it is better to specify an identification of “Stakeholder” value, which covers the ultimate customer who is stakeholder of the service as well as internal and external customer within the service with an interaction to the service delivery. This interaction can be for example from making a decision, inputting into the process, setting policies and regulation in place for the service, or receiving the output of service while actively engaging.

The significance of stakeholder identification as a prerequisite of value identification is clearly expressed in Womack and Jones’s (2005a) article which emphasises the need for moving from Quality, Cost and Delivery to “value” by understanding the customer through their involvement. However, within the multi-stakeholder HE service environment, identification of Value can be

complicated by the only presence of key stakeholders who have power on making decision for the service delivery, while the remaining stakeholder voice is lost.

The need for understanding the complexity of the problem before determining a solution by representing all of the stakeholders at the outset of improvement project, can be backed up with the emphasis of a successful Lean thinking approach on delivering effective improvement rather than just 'efficient' focused improvement. In order to have an 'effective' improvement the problem needs to be understood thoroughly, to enable the development of the solution which manages value across the organisation rather than efficiency improvement of an isolated process within the service.

The review of the cases where Lean thinking had been applied within HE identified a requirement for a post implementation review and change to the solutions to fit with stakeholder expectation. This approach at the end of the improvement project not only is costly and time consuming but also acknowledges that the solution has been developed for the stakeholder rather than with stakeholders. The risk of not understanding the complexity of the problem also becomes greater and, in result, the solution might not deliver the effective expected improvement. Moreover, getting consent and 'buy in' to the solution which has been developed for rather than with the stakeholder is harder.

Halachmi (1996) suggested "Getting consent to change externally owned process is a huge task and can involve collaboration with many stakeholders". Identifying all the stakeholders of the service, will address the problem of optimising part of the process and facilitates getting consent to change externally owned process i.e. cross functional boundaries within the organisation. Cross-functional projects often involve a collection of people drawn from many different sets of skills, different departments and sometimes even different organisations.

8.4 The relevance of identifying stakeholder requirements and order of their relative importance

Moving away from command and control and Lean manufacturing to Lean thinking as it was articulated within the literature by both Gullede et al. (2002), and Seddon & Caulkin (2007) who suggested the main reason for failure in improvement is that "in command-and-control thinking the purpose of the system is set to meet the target". And hence the work gets designed only around the reporting requirements with poor stakeholder focus, rather than the stakeholder requirements. The review of business improvement methodologies in public service by Radnor (2010) identified one of the barriers for process improvement were the opposite of the success factor e.g. little consultation with stakeholders, lack of methodology, and their poor engagement and communication. According

to Jackson, (2003), “fundamentally simple solutions fail because they are neither holistic nor creative enough”. The Holistic view requires considering organisations as a system with subsystem and supra systems, through which any changes need to be planned, based on the impact and need of subsystems to improve the system. The aim proposed by Womersley et al. (2001) for involving stakeholder is to allow continuous improvement of the product/service while involving the downstream stakeholder allows early consideration of issues throughout the design development.

The more complex the process or system, where functional boundaries and multiple stakeholders were involved the greater the likelihood that all of the relevant stakeholder would not be engaged, that their requirements would not be appropriately understood and that this could lead to sub-optimal outcome for the project. In order to be able to design the service around stakeholder requirement i.e. stakeholder value identification, it is required to overcome the service complexity in dealing with the intangible output, and more than one range of stakeholders i.e. multiple-stakeholders. This would allow the value to be a stakeholder specified-value, not only organisational, or key-stakeholder specified-value for a holistic solution.

Service within the HE can fall within two spectrums of “Complexity”, from ‘low’ complexity services to ‘high’ complexity. As the complexity of the service increases the number of stakeholders involved in service increases too, i.e. ‘multiple stakeholder’ with ‘greater complexity’ and in result greater number of expectations. Designing a service with the desired expectations requires an understanding of complexity and a need for simplification without the loss of fidelity.

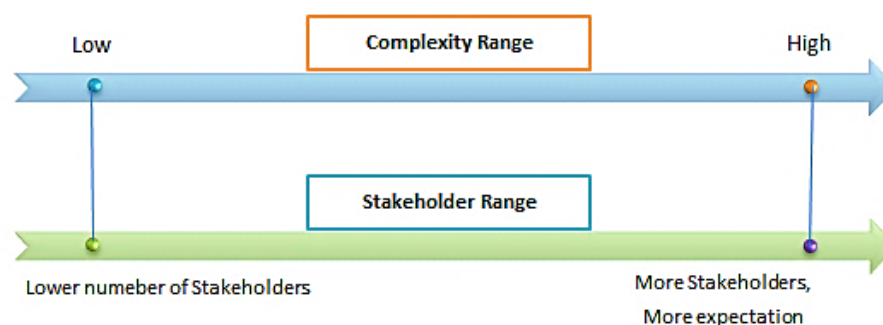


Figure 8.1 Example of relations between stakeholder range and complexity of service

The Low-Complexity service range is closer to the manufacturing environment in a way the communication between the lower numbers of the stakeholders is easier to manage and it is more likely that the business improvement can be managed to work successfully around designing a solution based on the expected value from the small range of stakeholders. Nevertheless, as the complexity increases the number of stakeholders increases too, and within the complexity of the service representing multiple-stakeholder, managing different range of expectations will be

extremely hard and confusing with running the risk of dominating stakeholders' expectations or leaving the gap for costly rework by developing the solution only based on certain expectation from key stakeholders i.e. ultimate customer or process owner. This would lead the organisation simply to one direction and that would be losing the sight of what is important for stakeholders, i.e. hearing the Voice-of-Stakeholders' and focusing on assumed value which can come from solely management expectation, process owner past experience, and the general proposed aims and methods within the business improvement methodology, that supports their expectation like higher efficiency, shorter lead time, and higher quality. Although these might be the right value for the business in general, it does not assure an effective, satisfactory service, which can lead the service into consuming time, money, and resource towards the change while it does not have an overall impact on service effectiveness with a holistic solution.

The Case-studies illustrated that analysis behind the change for improvements are mostly based on what has already been established by Lean in manufacturing as a key to success, such as shorter queues, increasing the efficiency of the staff, removing the duplication of data input, and overall removing the 7-wastes proposed for manufacturing, without investigating the deep root of problem before determining the solution. Even in cases which have been reviewed in chapter 4 and 5, where all the stakeholders were involved, their involvement was either purely with the purpose of only identifying the process steps, or they were involved at the end of the project to be introduced to the developed solution. Not for gathering their requirements in a formal manner to understand the problem before determining a solution for improvement. The evidence from public services (Radnor, 2010) indicates, "A lack of clear communication regarding the process improvement can lead to anxiety amongst staff and also a perception that the approach is not relevant for their role and organisation", so by involving the stakeholders and eliciting their expectations creates the required communication bridge at the outset of the improvement.

Not identifying the stakeholder Value, increases the possibility of consuming the resources towards un-required or not fully covered expectation changes, and in Lean any activity not required by the customers is waste. Regardless of the proposed aim for the improvement by using a Lean management method, if the approach is over-focused on waste reduction, by using resource, time, and budget but not delivering effectiveness it can 'increase' waste in the system. By only removing proposed waste from manufacturing, from HE service a greater waste such as workaround waste can be built up, i.e. by only removing internal inefficiency the effectiveness of the service cannot be expected to be improved. The importance of fact that there are some risks to implementing Lean- as recent examples in Toyota (Radnor, 2011) and even Mid Staffordshire General Hospitals NHS Trust (Radnor, 2011) have shown it can mean the organisation focuses on the wrong thing, this could not

be assured unless at the outset of the project the requirements of the stakeholders are understood and have been used to guide the optimisation of service effectiveness.

As has been mentioned in the literature review, one of the major differences between managing education and the other industry environment -especially manufacturing industry- is that they are more plans-based and less policy-based whereas, education is more policy-based than plan-based. This is explained by Radnor (2010) as the different form of value which does exist within HE (public sector), e.g. adherence to policy, laws and equity. By representing all the stakeholders and capturing all their expectations in a structured manner, it will lead to the identification of value, by having an expectation from stakeholders whose policy, laws must be included in managing the service while other stakeholders such as customers, process owner expectation will be captured at a same time.

The more complex the process or system, where functional boundaries and multiple stakeholders are involved, the greater the likelihood that all of the relevant stakeholders will not be fully engaged, that their requirement will not be appropriately understood and that this could lead to a sub-optimal outcome for the project. Representing all the stakeholders and capturing all their requirements, does embrace a complexity which needs to be simplified without the loss of fidelity, rather than keeping the improvement process simple and denying the benefit of stakeholders involvement towards effective improvement, and just involving the process owner in an isolated approach to the service delivery.

8.5 The VOS-model as an analytical navigation framework

The preliminary study resulted in the research problem that, “in order for an improvement project to be perceived as successful from a stakeholder perspective their requirements would need to be understood at the outset of the improvement project and that where complexity includes multiple stakeholders, with a number of objectives, these would need to be identified and prioritised. In order to provide consistent results and sustained improvement, this action should be an explicit part of the improvement methodology utilised”.

Based on the research problem the research aim was set as, “To provide a means of identifying and prioritising stakeholder requirements at the outset of an improvement project, such that, the resulting outcome provides a ‘better fit’ solution for all stakeholders”.

To do so, establishment of an analytical methodology was required to represent all the stakeholders to an improvement proposal of a project, and to determine the importance of the complementary and complexity of stakeholder requirements. Therefore, while the model required proposing

strategic level thinking on how to specify value desired by multi-stakeholder it needed to simplify the complexity without the loss of fidelity.

The VOS-model is developed as an analytical navigation framework, to get the project originators where they want in controlled manner. The Model consists of several stages, each having an output. The output of each stage, works toward building up:

- Clearer expectations;
- Less ambiguity regarding the value definition, and
- The better management of the improvement project.

As it was describes in chapter 3, figure 3.4, the research framework was designed based on Checklands'(2000) Soft System, and Meredith(1998) research cycle. This was designed by going through the cycle of;

- Developing the rich picture of the situation considered problematic, through literature review and studying the subject of 'how Lean is implemented in HE?' and expressing the situation through the exploration of desk research, and observation. Aiming for displaying the situation so that the range of possible and relevant choices can be revealed.
- Moving from real world and desk research to system thinking, description of the real world to model in the succeeding stage was developed as 'Research Problem'. This indicated the need for representing all stakeholders to capture their requirement and balancing their requirement to provide guidance towards service effectiveness. The four diagnostic questions were designed based on the root definition of relevant concern raised from literature review as the gap.
- Initiating debates by comparing 8 HE Lean improvement desk research models, 6 stakeholder management models, and 10 HE case studies, concerning desirable feasible changes which was described as research problem and diagnostic questions. This is the comparison of 'what' with 'hows', with the purpose of questioning whether the research problem can be located in the real world, how well they are performed, and if alternative way of doing them could be suggested.
- 'Changes' and 'Action to improve the situation' concerns the implementation of the changes to improve the problem situation. This was through an iterative cycle of development and testing of the VOS model stages. Followed by testing the application of the model through applying the model to 5 improvements project, eliciting stakeholder feedback, and comparing the set research objectives and sub-research problem with outcome of the model application.

The development of the model had included iteration and testing cycle, i.e. after development of each stage it was tested in real life projects which provided the VOS-model containing 8 stages.

8.5.1 The VOS-model development and iteration

The research problem has been divided to sub-research problem in order to make more manageable steps towards development of the model. The four sub-research problems are:

- H1.1 Represent all the stakeholders at the outset of the improvement project
- H1.2 Establish a formal process to capture and elicit all the stakeholder expectations
- H1.3 A formal process to quantify, prioritise and balance the stakeholders' expectation in order to streamline the value flow in a structured manner
- H1.4 The defined balanced requirements to be used to guide optimisation of service effectiveness to ensure meeting the existing and emerging needs

Based on sub-research problem the first pre-model archetype (figure 6.1 the visual presentation of the initial brainstorm that has been put together within this research) was developed which showed, based on required data i.e. range of service, a representation of all the stakeholders and their requirements the way forward to present the data can be through a table of matrix. As within the literature review the tools already in use for exploring and discovering Voice of Customer (VoC) had been reviewed, the QFD matrix format appeared to be fit for purpose. By range of service, it is meant: the services provided in the specific area of the University which requires the most attention for improvement. This would set up a platform for choosing the service for improvement.

The IT Service was identified at a strategic level as one of the areas requiring improvement. The result of investigation on discovering a single document which holds information on the services which are delivered within the IT department identified the need for including the stage within the model, as there was not any single document holding the services provided to the University. The IT department is providing a vast range of services across the University, within divided functional boundaries. The first matrix was developed as a 'service range' and stakeholders list, followed by a listing each of their requirements separately, which increased the visibility for IT managers and staff to see where the service they are providing are overlapping and provide a better understanding of their daily work as a service rather than as an isolated functional process. The positive output led to

the introduction of a new project by head of the department for making IT-service catalogue for stakeholders.

- Care point 1. Through listing the stakeholders it was learnt the ‘service provider’ is the best person to list the stakeholders, as they are the one who knows the service the best in the case of who they interact with daily or long term.
- Care point 2. The positive approved visibility, on the other hand contained an increased complexity. It was realised the first stage requires to be fractured to more stages to be able to offer a structural and focused approach. Therefore, a step was taken back, and iteration was done on **stage 1** to have an outcome of ‘listed service provided within the area requires the most attention for improvement’ i.e. service range, followed by second stage as ‘selection of the service’.

Stage 2 was put in place with the aim of narrowing down the service range to the more specific service for a more focused improvement. As the model is an analytical model, the suggested tools to be used in this interventional was the Boston matrix, and Impact/effort analysis. The test on this stage was on a new project; case 2 (University international visa service). ‘Post-visa granted monitor’ was selected as “the service” for improvement based on its higher impact on the expected output for UKBA.

With the service is selected for improvement, all the stakeholders can be represented. Typical stakeholders include managers, people who work in the process under study, upstream and downstream departments, customers, suppliers and finance (William, 2000). **Stage 3** was put in place to represent all the stakeholder against the service.

- Care point 3. It was realised that the typical way of differentiating stakeholders in general term is mainly either based on marketing segmentation, or their power on making decision, which in both approach the interaction between the stakeholders will be lost. Therefore it was required proposing within the stage a new way of classification which do not disqualify any stakeholder but considers all the stakeholders as important as the other. This developed the output of stage 3 as “classify stakeholder” based on proposed stakeholders classification as; Service Provider (SP), Service Receiver (SR), and the Affected/interested Stakeholder(AIS)

Based on the research problem to remove the risk of non-holistic improvement, all the stakeholder needed not only to be involved and represented at the outset of the project but also need to have the right to mention their expected attributes from the service. Through the stakeholder being presented, they will be able to see the ultimate benefit, as well as raise their expectation and issues,

and in result they will be encouraged to work towards the change and improvement. They will for example compromise rather than be critical about the change. **Stage 4** developed to accommodate the cooperation of stakeholder by capturing what is desired from the service by each stakeholder, and understanding how wide the variety of the expectation are, while gaining a better understating of the problem.

- Care point 4. Following to capturing the attributes from stakeholders it was realised that between the attributes specified by individuals, there is a commonality of interest with other individual. Therefore stage 4.1 was included to highlight 'sharing interest' within the matrix.
- Care point 5. Retrospect on in the set aim, the model is not designed to provide a solution in case of tension, but it's designed to be explicit in revealing the tension and alignments to enable the participant to address them consciously for the integrity of the decision. Therefore sharing interest is accommodated in stage 4.1 but the clash is left to be dealt with in the last stage. It was expected that the attributes will go through filters and the ones regarded as really important left to be compared against each other for defining any clash, or disagreement from the stakeholders.

From stage 4 onwards in the model, it was noticed that having an analytical skill set in improvement team would help the better understanding of service, business, environment and priorities. This stage is expected to take longer comparing to the other stage as it involves gathering attributes, while it requires analysing the information for better understanding of the whole service and stakeholders.

Having a big list of expectations from all stakeholders is what can be seen as a big challenge, an unmanageable task to overcome, and the main reason for not involving all the stakeholders in the improvement within the reviewed cases and models. Therefore, it was required to design the next stage in a way to sort the 'unmanageable' list, to a manageable set of attributes for working forward. The attributes were all specified as qualitative data, it was required to be able to measure the relationship of the attributes. To do so required to assign numbers to attributes in such a way that the relationship of the numbers reflects the relationship of the attributes being measured. The tools which full filled the requirement for this stage were; Pairwise comparison matrix and Weighting. The suggested tools can facilitate the process of comparing entities in pairs to judge which of each entity is preferred, while the qualitative attributes get assigned to quantitative numbering. In order to be sure the expectations are not disqualified by the service provider, the responsibility of **stage 5** is allocated to each stakeholder to select the most important attributes over the others within the

ones they mentioned, through the use of proposed tools. The tools are suggested so the selection between the attributes happens in critical, systematic, and standard manner across all the stakeholders. The selected most important attributes are titled as the “VOS”.

- Care point 6. Reviewing the pairwise comparison for case 2, highlighted the attributes with multi-interest from stage 4.1, they can have a different combination of selection in the pairwise comparison matrix. This can show the different ranking of the same attributes by each stakeholder depending on their input and involvement with the service. Analysis of this selection would help the project leader/manager or improvement team in an understanding of the prioritisation of each stakeholder to a better extent. These are clarifications not normally done in the process currently being used. This can reduce the risk of working on an incompatible solution for the current situation.

The selected quantified attributes i.e. VOS, require to be mapped against the business criteria for defining the extent to which impact can be expected. For prioritising and balancing VOS by considering time and business criteria, the Kano model concept was used as a starting point. The colour-coded classification was developed as Fundamental, More is better, and Delighter. The trade-off between VOS and Business performance can be used later on as a measure to check whether the business has been better off or not. The progress from delivering the Fundamental towards delighter shows us the update as well as a platform to measure progress against. In addition as the stakeholder expectation is dynamic, as long as the service is in place, defining value for HE service will be a continuous act as well. The model guides the improvement towards meeting the dynamic characteristic of expectation and allows tracking back the improvement impact. Over time the ‘More is better’ VOS attributes in the service becomes the Fundamental expectation, as the expectation cycle is dynamic. Traceable information of existing and emerging needs from the stakeholders fits perfectly with the C.I concept in Lean. There is a chance that the organisation might not allocate resource and time to the service for further improvement, but even within an initial improvement the solution can be made having an insight on existing and emerging organisational needs.

- Care point 7. The trade-off table of VOS in case 2 confirmed the concept of all stakeholder are important, as it visually presented in the ‘fundamental’ category there is a mixture of AIS,SP, and SR’S attributes. This approved not having had involved all the stakeholder would result in these not be a full list of what was categorised as fundamental for delivering the service, while practically showed the criticality of all stakeholders to be involved at the outset of the improvement project.

By reviewing the balanced and prioritised VOS, it was realised, as they are mentioned by the range of stakeholder with different background, there is a need to make sure these are orientated in business-management language, to be able to act on them. The analytical method fit for purpose was found to be the six sigma approach, and it was called 'critical to value' with an output of 'value-driver' in **stage 7**.

Following to defining of the 'value-drivers' for the service, it was required to find the gap between the expectation and the actual state of service provided (**stage 8**). To gain an understanding on current state of the service on its process, activities, and stakeholder intervention, it was required to follow the sequential activities and gradually understand the information and work flow. There are different methods of mapping, flowchart, diagram which might be used however, to build a structured way of relating the actual/current state, value-driver and expected state with each other was needed. To do so, the value drivers were allocated against the phase and stage of the process which they related to, and the actual output of the service investigated for each phase. As the value-drivers were colour coded it is easy to identify which value-drivers are 'fundamental', 'more is better' or 'delighter'. Depending on the extent to which it is decided to deliver the value-drivers the expected output statement can be phrased.

- Care point 8. The expected output is not a proposed solution, but it is an indication of the extent to which the value-drivers are planned to be delivered.
- Care point 9. Stage 8 will be followed by the solution development, where it is expected the stakeholder will be communicated through the project and get updates on the progress and decisions.
- Care point 10. The possibility of any clash between the attributes left to be dealt with after the last stage, as the attributes by then have gone through filters of balance, prioritisation and trade-off. The ones crucial with high priority were selected by stakeholders and then can be compared against each other for defining any clash, or disagreement from the stakeholders. This will be done by having a clear vision on whether they are within fundamental, or one in fundamental one in more is better, or even delighter. Hence making a decision is much easier with visibility. The model is not designed to provide a solution in case of tension, but is designed to be explicit in revealing the tension and alignments to enable the participant to address them consciously for the integrity of the decision.

8.5.2 Result of using the VOS-model

The world class business is pictured by Womack (2011) as the one which its process is driven by customer expectations, while it maximise the opportunity for interaction between stakeholder, the decision is made by those closest to the work, and one-time entry of data which will be accessible to all stakeholders. The VOS-model does guide the business to all area mentioned by Womack, through its stages. To confirm this, the model had been used in 5-different projects across the Coventry University.

The Validation project based cases were:

1. Course and Module creation
2. HESA Report
3. 24/7 IT service support
4. Student information report data-quality
5. IT Asset Management service

The Course and Module creation project VOS-model implementation was used when the project was in the phase of the proposed solution implementation. It allowed the opportunity to compare the output of using the model with the output of not using the model. Based on developed stage in the model development phase of the research, all the stakeholder were listed, communicated through meetings to be introduce to the project, their expectation were captured through one-to-one and group meetings, their expectation were narrowed down by each particular stakeholder to VOS, while the trade-off stage confirmed the importance of all the stakeholders involvement as there were AIS, SP, SR, voice within the fundamental to service category. The initial proposed solution for improvement of the service was; to automate the data input from Registry office into the central student data holding system i.e. UNIVERSE.

This meant the automation is part of the current process managed by the Registry office, as they have asked for an improvement to improve localised efficiency and remove waste on chasing up academics, and manual input in two systems used by them.

From the initial problem raised by the Registry office (AIS), they were the one spending large amounts of time on chasing academic (SP) for required information specified for each phase, and the solution had been designed to remove this waste. Whereas a deeper bigger picture provided by the VOS-model revealed Academic were the one who as the SP were struggling the most in delivering on-time because the requirements for delivering the service effectively was not in place. The

identified value-drivers from using the VOS-model highlighted these different areas within the service.

- At the draft documentation stage; the expected output was worded as 'marketable, joint business-academic, new program proposal for a specific audience'
- At stage 1,2,3; the expected output was worded as 'streamlined process with interoperable systems and reliable data'
- At stage 4; the expected output was worded as 'Clear marketing strategy (i.e. audience, method, and time) with reliable enrolment system'.

The VOS model not only revealed where the main issues were but also proposed the value-drivers guiding towards the expected output helping all the stakeholders focus on an effective service delivery. The result of VOS-model was holistic enough to communicate with project manager that the initial proposed solution would not fit for the ultimate improvement purpose of the project, and to stop the further time and funding spending, the development of an automated system was stopped.

- The benefit of using the model in this project was providing a guidance on realisation of the problem, expectation and value towards the effective service delivery for all stakeholders

The HESA report project was raised by Planning Office (PO) who was clear about the solution they wanted to be implemented as an improvement over the existing arrangement i.e. the automated notification on any changes made in UNIVERSE fields which gets reported to HESA by the PO. The previous solution proposed by PO which had been in place for a year, was the 'lockdown period' indicating no changes were allowed to the student record in UNIVERSE unless it was initially communicated to the PO. Within the initial solution in place, the specific lockdown start date on amendment was communicated to the faculty registrar's in an email annually by PO. As the staffs within the faculties still were amending the students' record in the lock down period, without raising it to the PO attention, the solution did not solve the problem.

At the start of the project access to record appeared to be so wide spread across the University that controlling the change seemed impossible and only auditing was the way forward. By using the VOS-model value co-creation with all the stakeholders was developed from the start of the project. Even if the PO as the SP of the service by seeing the result from stage 4 (classified stakeholder and the service attribute matrix) and stage 5 (VOS), questioned the need for other stakeholder to be involved in this improvement and have access to the result i.e. the change made by faculties to student record, but the stage 6 (trade-off between the VOS and business performance) and stage 7 (Value-drivers) helped the SP to understand the importance of other stakeholder involvement as

well as the reason the expectations has been mentioned by going through asking what is the issue and reason behind the stakeholder mentioning the attribute, the requirement needed to be in place to deliver that, and in result the value-driver formation.

- The benefit of using the model was through delivering a wider improvement and visibility within the university by offering the required control not only to the PO but also the stakeholder to get better understanding on the changes are applied to the student record.
- The bigger picture provided by using the model enabled the better understanding of the problem and requirements, which allowed the project team to plan based on knowledge the resource and delivery of the improvement in two phases.

In the 24/7 project case, the University decided that the IT department required changing their strategy to become more service based rather than system based. The VOS-model was used to study the feasibility of the new proposed direction of the ITS Heads. The decision made by Heads was that the 24/7 service support would raise the service level provided by IT. However the VOS-model demonstrated that a wider and different direction was required for fulfilment within the service. As a result of gaining knowledge about the current state of the service and the value-drivers, the new project launched with the configuring at the SCSM (System Centre Service Manage) system within ITS service desk, which was one of the main aim an implementation of SCSM with the report module so proper analysis can be carried out. This would help to make an informed decision moving towards a 24/7 support model. Parallel to the mentioned project, a second project was launched looking in details on the expectations mentioned by International Office (IO), a business analyst was allocated to reviewing the problems and future travel to India (Delhi) to consult with the stakeholder.

- The benefit of using the VOS-model in this project was to provide guidance towards the effective delivery of the service, by identifying the value-drivers for the service through stakeholder involvement.

With the student information report data quality project, The model was applied in the pre-project phase, even so convincing the project manager was not easy, as the assumption at the time was that the ultimate solution of 'quality data' was clear and that all the stakeholder will agree on that, therefore no additional time on double checking stakeholder expectation is necessary.

- The benefit of using the model is that capturing the stakeholder expectations helped to clarify 'how' the improvement can be delivered not only 'what' needed to be delivered. That was a result. Even though the stakeholders expected 'reliable, quality data' the detail given on expectation made the quality definition and the situation clear to work forward on, for an effective delivery of the ultimate service

- A wider benefit across the university was also realised; 369hrs saved over 7.5 month in PO, Improvement on data accuracy impacting on funding and University ranking, more user-friendly layout for students inputting data in web-based systems and accurate business requirement for IT development team.

Within the project in managing IT assets, specifically Software Asset Management (SAM), the SP (Local Delivery), convinced the senior manager and IT Heads that all they required would be a system to deliver a better service and remove all the inefficiency. Using the VOS-model confirmed that the project had a greater number of value-drivers comparing to the previous projects, which was a reflection of the size of the service the greater gap which required to be filled with the improvement.

- The benefit of using the model was; it communicated that the effective improvement requires to pay attention to the improvement in the system in use, process standardisation and compatibility between the systems
- Moreover, not only the existing requirements for improvements were communicated, but also the exceeding expectation classified as delighters was highlighted which might be considered in purchasing the new system, and the future plan for improvement in the service.

The VOS-model confirmed delivery of the real effectiveness and provided guide for HE services towards the required shift. The improved efficiency comes into the system when the process is streamlined based on provision and consumption. This needs a huge shift in the current approach of service provider about the relationship between provision, consumption and the role that stakeholders play in the service.

Regarding the time taken at the start of the project to implement the VOS-model it should be considered that it is a trade-off between the thoroughness of the solution and the time it taken to deliver an effective improvement which manages value across the organisation. The time it takes to involve all the stakeholders and a consideration of the cost i.e. level of being resource intensive have to be compromised with reduction of possibility for an efficient process to be developed within an ineffective service.

Just like in manufacturing where defects require rework, in HE service, defects in the process or the solution which is not fit for purpose would also require rework. By using the VOS-model, the rework rate can be decreased and as the stakeholders expectations are considered from the start, stakeholder allocated time will be on the improvement and development of the value-driver for the

service rather than time being allocated to the evaluation and feedback on proposed solution in the post-implementation phase.

Regarding the resource intensiveness; depending on the degree to which there is a complexity where the number of stakeholder is low and all are in agreement, the VOS-model would require much less time to be implemented, while it can still guide the improvement and provide a navigation towards service effectiveness.

Therefore it is considered that it is worth the stakeholder time to be involved at the start of the improvement project, avoiding a risk of running into difficulties which will be associated with cost and time to be solved, which might end up being more expensive than the outcome and benefit of using the VOS-model.

The qualitative feedback captured across the improvement projects regarding the VOS-model implementation were all positive, referring to the model as; 'useful', 'helpful', 'there was a need for it', as well as referring to the positive impact it had in support from the stakeholders and the development of the solution.

The feedback is categorised into three categories:

1. The need realisation; with the confirmation and understanding of the need for use of the model, stakeholder involvement and change of their current approach for improvement
2. The benefit realisation; which indicates all the benefit mentioned by stakeholders through implementation of the model
3. The change on the characteristic of the developed solution realisation; which indicates the model had in the development of the projects solutions

1. The need realisation
Helpful to understand and remove the complexity
Helpful to check the improvement is on right track, towards effectiveness
Helpful in analysing the service easier
Different from our approach, but the benefit realised by using in improvement
There was a need for a method to articulate the views
Useful for the involvement, communication, and being notified in regular meetings
Positive that we are involved from the beginning
Result was different from what we were thinking and highlighted things required to be considered

Highlighted the problem we had in data management
Understanding a real problem
A better holistic understanding of current service
A better result for everyone
Change of the approach towards an effective delivery of the service

Table 8.1 The 'need' for the model realisation qualitative feedback

The feedback not only confirmed the need for the model, but also the need for changing the approach towards creating a common understanding of the real problem, a better result for everyone and effective delivery of the service.

2. The benefit realisation
Useful in putting things in place
A picture of wider benefit realisation
Surprised to be involved early on, and happy to communicate the expectation
Really useful for us(stakeholder) and University to be able to bring the expectation and issues to management attention
Helped us to understand what stakeholders wanted
Improved stakeholders response and support
Quality of capturing and managing stakeholder requirements improved
Stakeholders in agreement from the start
Increased stakeholders satisfaction and interest
Stakeholder better support
New ideas and suggestions through stakeholder meeting
Chance to raise the issues and need for improvement
Helpful as is meant our requirement could be considered within the development of improvement solution
Abled us to express our expectation and put things in place
Not only to mention our expectation but also our expectation was considered throughout the solution development
Approved the real need for improvement based on provided analytical data
Much easier to understand and a clearer picture for making decision

Table 8.2 The 'benefit' of the model realisation qualitative feedback

The benefit realisation feedback highlighted the usefulness and helpfulness of the model for enabling the stakeholders to have a Voice in improvement project with the result of better support and understanding from all the stakeholders and the realisation they are part of the 'big picture' of service delivery. This opened the door for positive, constructive input from stakeholders.

3. The change on the developed solution realisation
Support and compromise of stakeholder on delivery plan rather than being critical
Being able to work on the solution in more controlled and manageable time-frame
Number of solutions were able to be identified and via presenting enough material to make the right choice
The expectation help to develop the business specification for development team
The solution is the best package we could end-up with
Existing and emerging need was communicated which helped the development of the solution
Helpful in removing the failure point in service delivery
The solution reduced the time we had to allocate for reporting to PO
A wiser and wider perspective in selection of systems (the solution)

Table 8.3 The change on developed 'solution' by using the model realisation qualitative feedback

The feedback on changes realised in the development of the solution by using the model at the start of the project, indicated the clear understanding from the stakeholder and project manager on what is needed which made the development team more able to plan and work in controlled time-frame. Having the required relevant information enabled project teams to develop a number of solutions considering the delivery of requirements at different level i.e. fundamental or all the requirement including the 'delighter' ones. Having had the information provided in an analytical visual format made the selection between the solutions easier as well. The solution had a positive impact in increasing efficiency (saving time) not only for SP but for other stakeholders across the service. Providing a holistic picture for the service, on issues and existing and emerging needs was helpful in removing the failure point on service delivery and a wider perspective towards the development of the solution.

The feedback confirmed the model had delivered the sub-research problem and each had a positive impact on the managing of the improvement project. Representation of all the stakeholder at the outset of the improvement project (H1.1), the established formal process to capture and elicit all the stakeholder expectations (H1.2), the formal stage in the model to quantify, prioritise and balance the stakeholder expectations in order to streamline the value flow in a structured manner (H1.3),

and the use of defined balanced requirements i.e. value-drivers to guide optimisation of service effectiveness to ensure meeting the existing and emerging needs (H1.4).

Thus, in constraining the case study project teams to follow the VOS-model improvement methodology guided them to address the steps that are designed to concentrate resources on identifying the importance and relative importance of stakeholder requirements for achieving a measurable project result that will ensure real improvement for all stakeholders in the outcome. In doing so, actions that result in the dilution of effectiveness can be avoided. For example, those expediciencies that do not acknowledge all process or systems stakeholders, or those that inappropriately marginalise or fail to capture entirely the stakeholder requirements aimed at securing an outcome for a single purpose – often a predetermined outcome, or projects where a single stakeholder is perceived as more important than the others or where a ‘quick-fix’ mind-set and thus sub-optimal solution prevails.

8.5.3 Variation observed in case studies

The two main areas which variation was observed within the validation improvement project cases were:

- The engagement of the stakeholder
- The relationship between the level of complexity and the alignment of expectations

In the HESA report validation case, Business Faculty (BES), Registry Office (RO) and International Office (IO) did not reply to the request for a meeting in order to capture their requirements. Anecdotal evidence collected indicated that:

- Timing; there are certain time within academic calendar representing a peak time in the case of workload, such as enrolments and admission. It was apparent that BES, IO and RO were busy in this period, when the requirements for HESA change report were getting collected for the project. Hence, within the improvement approach where the presentation of all the stakeholder is required and understood, the improvement should be planned off peak times allowing the stakeholder availability for their beneficial input or where this is not possible particular effort should be made to ensure all stakeholder representation.
- Resource; where there had been changes in the case of structure and a reduction in the number of resources, which made the priority of the areas within the University different.

This can be as a result of not focusing on service but on one isolated process or functions within each area, which creates boundaries between the departments.

- The old perception of stakeholders from past improvement projects experience; as there has not been a workshop in introducing the model rather than initiating and presenting the stages within the project in action, some of the stakeholders preferred not to allocate time in involvement as they could not see any perceived value, making an assumption that at the end the improvement will be made based on the requirements of the ones working directly on the end process (the end customer and front-line service provider). The two reasons for not having had a workshop was lack of management support to train everyone on the model stages (as the benefit of using the model needed to be shown first), and secondly the aim was to ‘sell’ the model to stakeholders by showing the benefit it can bring to them in action rather than as another framework. Therefore, it was just a matter of time in showing the change of approach in action. This in particular enabled the stakeholders to understand the benefit of the model in a different way, gradually by allowing these true opportunities and showing savings to be identified as well as a chance for stakeholders to have their voices heard. The only way to earn and retain that was by keeping them involved in the progress throughout the project.

Taking Radnor (2010), Caldwell et al. (2005), and Lodge & Bamford (2008) advise on a way to overcome the resistance by working with a stakeholder to develop trust, and keeping everyone in the information, communication loop and seeking the win-win situation for projects. Eventually “many will change their opinion”. Therefore, to make sure RO, IO, and BES were happy with the value-drivers, and later in the project with the solution, emails were sent out with a specific time frame as a deadline to reply back if they were not happy about the communicated information.

The relation between the complexity and expectation alignment in ‘Student information data quality’ improvement project, unlike the other cases, even though the project had multi-stakeholders (8 stakeholders), the range of expectations were aligned greatly, and in result took less time to go through stage 2, 3 and 4. On the other hand, in the SAM improvement project, the project contained a greater level of complexity compared to the other cases, having the service spread to wider areas of the university i.e. wider spread of stakeholders (11 stakeholders), with greater numbers of expectations, while the gap between the current state of the service with expected effective service also was greater. This highlighted the need for service improvement at different levels.

8.5.4 Evaluation of the model in context of Lean transformation

Whilst the core principle of Lean Thinking, i.e. Identify Value, Value stream, Flow, Pull, and Perfection gets the attention for implementing Lean in any process/organisation (Womack and Jones, 1996b), the most important element is argued to be 'specify and identify the value' (Womack and Jones, 1996b), specifying 'failure to specify value correctly before applying other Lean principles can easily result in providing the wrong product or service in a highly efficient way (Womack and Jones, 1996b). Value identification, is therefore the primary stage within the Lean principles. Thus waste can be initiated based on what has been identified as value by customer. It is therefore vital to identify and minimise or eliminate such wastes in the system. In a relatively simple environment the previously discussed 7 wastes can be quickly identified, however, as the environment gets more complex it becomes easier to miss out or not fully identify some of these wastes (Marin, 2012).

In a complex environment the VOS-model serves the need in 'identification of value' i.e. the first principle within the Lean philosophy. Having the value-drivers clearly specified at the start of the project would therefore benefit a Lean application, e.g. reduced process time, reduce lead-time and improved quality, facilitate the reduction of any rework or reactive improvements and the cost associated with them.

The VOS-model aligns with the recent needs of HE sector for being more effective and efficient, while it refines the solution to ensure there will not be any delays or rework during implementation, and the proposed solution does not create additional defects or errors. As explained in the first chapter, HE as with other sectors of the economy, has experienced challenging times in recent years, leading to a funding model to be changed significantly, which brought with it new pressures to be managed. While efficiency in the industry has been about doing more for less, HE will have to manage the cost of what they do and the value. This means having control over the costs while continuing to improve the service provided. For instance, standardisation and simplification has been used as a typical ways of efficiency saving in Higher Education Funding Council for England (HEFCE) reports such as the HEFCE funding prioritisation 2014-2015 (HEFCE grant letter, 2014), improved reporting and transparency of information (HESA, 2010) in Higher Education Static Agency (HESA), and to enable the sector to keep pace with the rapid growth in technological innovation (JISC, 2014) in Joint Information Systems Committee (JISC). As the VOS-model showed the types of efficiency can be different to that which has been implemented, this is a result of expectations changing within the fast changing commercial environment. Ballou et al. (2004), classifies the resource as tangible and intangible, where strength of stakeholder support, networks, quality of supply, know how, problem-solving ability, and management quality all falls under intangible

resources. And the important question can be raised on how to identify and quantify the causal impact of investments in intangible and intellectual capital resources (Ballou, 2004). He highlights the fact that any investment in tangible resources affects the current cash flow and value, whereas any investment of intangible resources has direct impact on future value. The VOS-model while it manages the complexity associated with the HE service environment and multiple-stakeholders develops an understanding of value perception of stakeholders from the service. By using the model within the start point of the project:

- All the stakeholders are identified and engaged
- All the expected attributes from the service are identified, quantified and prioritised, including existing and emerging needs
- The value-driver for the service is defined

This has been shown to increase the success of the project by having insight and guidance on expected improvement toward effective service. The ‘value’ anticipated by service stakeholders.

8.5.5 The validity of VOS-model in the identification of stakeholder preferences

The qualitative captured expectations needed to be narrowed down in a critical, systematic and standard manner across all the stakeholders. The two tools suggested to do this are ‘Pairwise comparison’ matrix and comparative ‘Weighting’ table. The suggested tools can facilitate the process of comparing entities in pairs to judge which of each entity is preferred, while the qualitative attributes are assigned to quantitative numbering allowing for easier ranking of importance.

The Analytical Hierarchy Process (AHP) of Saaty (1980) is a widely used method for Multi-Criteria Decision Analysis (MCDA) (Saaty and Vargas, 2012), because it elicits preference information from the decision maker in an understandable and easy manner. The basic step is the pairwise comparison (Lootsma, 1999). The advantage of using pairwise comparison is that the responses of the team should be more specific “as they have to consider each indicator’s importance in relation to all the other indicators” (Macoun and Prabhu, 1999).

Comparative weighting is a tool which gives the priorities of the alternatives over every other alternative (Saaty and Vargas, 2012). A weighting is used to obtain overall prioritise fro the alternatives as how they contribute to the goal (Schmoldt et al., 2001).

Pairwise comparison has been used in cases where the number of expectations was large with a low level of perceived alignment such as the ‘Course and Module creation’ project, ‘HESA report’ project,

and 'SAM' project. While the tool reduces the complexity it also helps the narrative of decision making for the user easier. In a project with high complexity, such as SAM project narrowing down the attributes might take longer to be done by stakeholder, nevertheless as demonstrated the analytical decision will be more understandable and therefore likely to be more actionable.

Whereas in the case of the '24/7' project, and the 'Student information data quality' project, where the expectations are small in number or perceived to be greatly aligned with each other, there is no particular requirement to use pairwise comparison. Use of the comparative weighting table was shown to be sufficient to narrow down the attributes, to identify the relative important to each stakeholder.

Therefore the selection of tool between the two proposed tools, i.e. pairwise comparison matrix and weighting table depends on the number of the captured expectation, and their alignments.

These two tools; Pairwise Comparison and Comparative Weighting were selected on the basis of usability. The accuracy of the outcome of analysis of this stage is however subject to the rigor applied by each stakeholder in correctly identifying the prioritise for them. The criteria that they might use to do this are deliberately not specified within the VOS-model.

It was considered reasonable to assume that each stakeholder was an expert in their own requirements and would therefore the best placed to make the decision on priority selection. Equally it is recognised that the tools selected for use within the case studies are not the only tools appropriate at this stage of model implementation. Other tools for example Nominal prioritisation, Prioritisation Matrix-combination, or Prioritisation Matrix-analytical may be preferred by the project coordinator or project leader/manager who would be expected to be an experienced project originator/ manager familiar with the concept of prioritising possible competing requirements.

8.6 The utility of the methodology

Within the predominant model of HE, which highlights the combination of Academic, Research and Service the VOS-model is designed for HE service section. The validation cases were selected within the service section of HE in range of; Strategic, Tactical and Operational level improvement projects. The cases were focused and covered only Coventry University organisation which were selected in a purposive to investigate the validity of the model in HE service environment. Therefore, it can be commented that the result of the study are not statistically generalizable. However, the findings could be analytically generalised given the in-depth level of investigation in each case. Being able to

deliver the output with positive feedbacks has approved the wider utility of VOS-model on different type of projects.

Extent to which the VOS-model utility can be generalised is reviewed in two areas:

- Where the VOS-model fits within the project life-cycle
- Where the VOS-model fits within the available Lean improvement methodology in HE

It was defined that regardless of the approach to improvement i.e. either strategic or RIE, the improvements are all project based. The captured feedback from the usage of the VOS-model indicated the benefit of the model on enabling the project leaders to understand the expectations, issues, and problem while the prioritisation and narrowing down the expectation is stayed with stakeholders. The generic project framework which most of the business improvement project goes through can be defined as; Define, Measure, Analyse, Improve and Control (DMAIC) methodology.

The basic project life-cycle can be interpreted as;

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Figure 8.2 The basic project life-cycle (Field & Keller, 2006)

In an effort to mitigate the resistance to change and have insight to Voice of Stakeholders, the 'define' phase is the stage where requirement for the project gets reviewed and analysed and based on the output of the analysis the resource, risks, tasks, estimate time/cost, and activities can be decided. The accuracy decision to be made between 'define' and 'plan' stage depends on the approach and how well the analysis been done. This can create more buy-in, identify better solutions, and avoid pitfalls (Williams, 2000).

As the PRINCE2 is widely accepted within the UK in project management, the VOS-model was mapped against the PRINCE2 project phase. Based on PRINCE2 material, a project contains of the main stages of;

- **Pre-project**
- Initiation stage
- Subsequent delivery stage and
- Final delivery stage

The 'pre-project' as a starting-up stage of the project in PRINCE2, is designed to make sure the pre-requisites for initiating the project are in place, while ensuring the information required for the project initiators is available. As the VOS-model, is designed as a 'navigator framework' to highlight the value-driver for the service and business, it is required to be used initially in the pre-project (Define) stage to give the project initiator a clear vision for planning the rest of the project. The VOS-model can be used and referred throughout the project as well on ensuring the stakeholder requirements are not compromised inadvertently as well as comparing the level of achievement against the value-drivers. Using the model in pre-project phase, facilitate to deliver the objectives of initiation stage as well by:

- Agree whether or not there is sufficient justification to proceed with the project
- Ensure a firm and accepted foundation to the project from stakeholder prior to commencement of the improvement
- Provide the baseline for decision-making processes required during the project life

The VOS-model is aimed to be designed without any complication, however, it does require:

- Business and data analytical skill
- Project management skill
- Project improvement responsibility
- Knowledge and experience in Lean philosophy, methods and tools used for improvement

Having had the required skill set in place, the model is designed as a 'navigation framework' for the project originator/manager by offering them value-drivers for integrity on improvement decision by taking in to account stakeholders' expectations.

Depending on project originator/manager preference the data can be gathered through a single workshop with inviting all the stakeholders, or it can be through one-to-one meetings and giving space and time to the stakeholders to come back if they want to add any other specific attributes. The second approach has been taken in model development and validation. The reason behind this was that the model is new, and the approach therefore needed to be explained while giving the improvement project team time to reflect.

Although the VOS-model does fit within the first principle of Lean philosophy i.e. value identification, the proposed Lean improvement methodologies within the HE have been reviewed as well to clarify the VOS-model alignment with other methodologies. Despite of the different wording used on each methodology for the stages, they all have the generic phase, which evolve around the Lean philosophy principles:

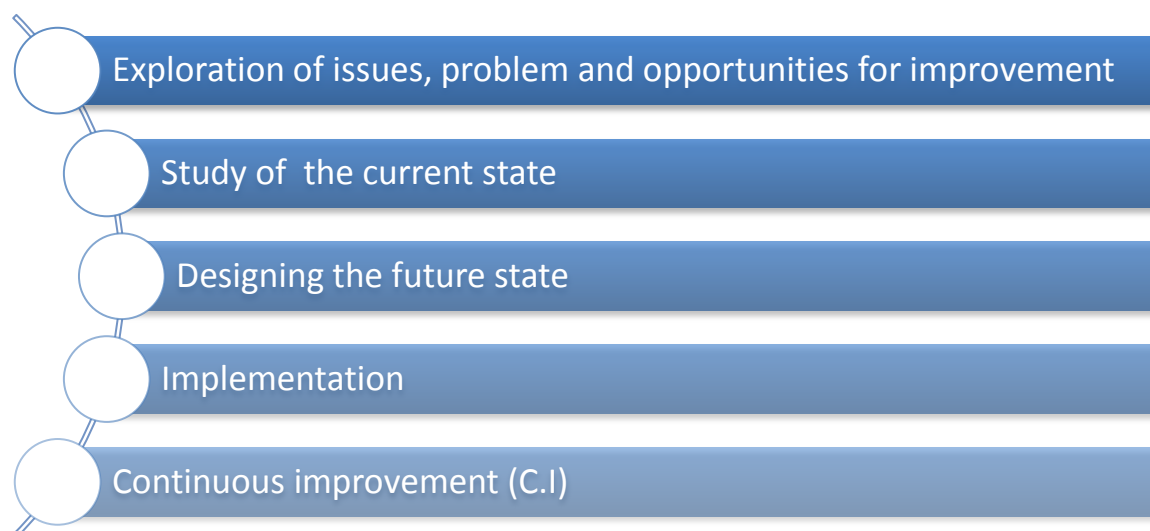


Figure8.3 Generic phase of Lean improvement methodologies in HE

VOS-model fits within the first and second stage of the generic phase of the Lean methodology in HE, by exploring the issues, problem, opportunities and study the current state of the service through analytical study of stakeholders' expectations, it helps the effective development of designing the future state ensuring the stakeholder requirements are not compromised inadvertently.

Even though the utility of the VOS-model can be generalised to wider service improvement within the HE, but still it needs to be tested through.

8.7 Limitation of the Research

As it has been demonstrated in chapter 6, 7 and 8 care was taken in designing and conducting the research, however it is important to consider and review the limitation of the research.

The first limitation was the available 'time scale' to implement the VOS-model to the range of improvement projects which were running at the time. The fact that only a certain number of improvement projects were approved by Heads of Departments to be run, and involving in each required a time allocation. Only 3 cases for designing the VOS-model and 5 cases in Validation of the model were managed to be participated in. The cases were all based on one organisation; Coventry University, the result of the researcher having permission to access the data, stakeholder and have involvement in the project improvement.

A further limitation is that although managing to participate in the different improvement projects, the implementation of the signed off improvement by the stakeholders – for some of the project – will not be completed in time to be included in the research, for example the ‘Student information report data-quality’. This report is to be submitted to HESA at the beginning of October and the report is done on the data from the previous academic year, therefore despite the implementation and the test which was done on available data in system, the project team will have to wait until October to record the delivered benefit.

The model showed improvement of stakeholder satisfaction and in a wider perspective the positive impact that it can have on the University profile. Feedback from stakeholder was positive, however to monitor the impact on using the solution within the University required a longer period of study.

A further limitation was that the VOS-model was carried forward in all improvement projects by the researcher’s initiation. The reason for this was at the point of time in the research, model validation was needed introducing the benefit of engagement to stakeholder and project leader/manager before being able to train and launch a workshop for the project improvement team and stakeholders.

A further limitation was not having management support from the start. Management support is one of the main points raised on all recent Lean implementation reports in HE. However, as the VOS-model was developed recently through research, gain the upper management support was not straight forward. With ‘real’ projects proof was needed of the benefit of using the VOS-model and at the time that was not possible easily unless by applying it in real projects. In this case the limitation was overcome by clear communication with the management and the project improvement team on the improvement projects which they were behind schedule on delivering the solution for example, the ‘course and module creation’ project and thus identifying the incentive for engagement.

8.8 Summary

To avoid actions that result in the dilution of effectiveness the VOS-model guides the improvement project to address steps that are designed to concentrate resources on identifying the importance and relative importance of stakeholder requirements for achieving a result that will ensure effective improvement for all stakeholders at the outset of the improvement.

For example, those taken for expediency that do not acknowledge a holistic view i.e. all process and service stakeholders, or those that inappropriately marginalise or fail to capture entirely the stakeholder requirements aimed at securing an outcome for a single purpose – often a predetermined outcome, or projects where a single stakeholder is perceived as more important than others or where a quick-fix mind set and thus solution prevails. In each case examples that do result in the very real risk of delivering a sub-optimal, parochial solution.

While the co-production of service is inevitable as the production of the service cannot be disconnected from the stakeholders the co-creation of value within improvement projects (within HE), in order to better inform and guide management of improvement projects, is the unique input from the research perspective.

As service may entail offerings that are relatively more tailored and complex than standard offerings, the VOS-model focuses on 'alignment' and 'complexity' management throughout the stages by alignment between stakeholders and reducing the variation complexity. In addition to typical successful Lean application, e.g. reduced process time, reduced lead-time and improved quality, the VOS-model reduces any rework or reactive improvements and cost associated with them.

The VOS-model is developed as an analytical navigation framework, to get the project originators where they want in controlled manner. Throughout the stages, by analysing the priority given by stakeholder to the requirements, the sharing interest, and allocation of equal priority to requirements, understanding of expectation is facilitated. The output of each stages of the model, works toward building up;

- Clear expectations;
- Less ambiguity regarding the value definition, and
- The better management of the improvement project.

While the VOS-model is designed to be used in the Pre-project phase in an effort to mitigate the resistance to change and have insight to the Voice of Stakeholders, and a holistic view of the service for the appointed project improvement team, it facilitates the delivery of the objectives within the Initiation stage, as well as throughout the project with providing a clear insight to the value and chance to review the improvement against defined value. The areas VOS-model facilitate the objectives of the initiation stage are;

- Agree whether or not there is sufficient justification to proceed with the project, i.e. feasibility of the project;
- Ensure a firm and accepted foundation to the project from the stakeholder prior to commencement of the work;
- Provide the baseline for decision-making processes required during the project's life.

In order for an improvement project to be perceived as successful from a stakeholder perspective their requirements would need to be understood at the outset of the improvement project. That where the complexity include multiple and competing objectives these would need to be identified and prioritised. And that to provide consistent results and sustained improvement this should be an integral part of improvement model utilised.

Conclusion

The conclusion is drawn by revisiting the original aim, objectives, and the purpose of the research. The aim of the research was to “provide a means of identifying and prioritising stakeholder requirement at the outset of an improvement project, such that in meeting the business needs the resulting outcome provides a ‘better fit’ solution for all stakeholders”.

Five objectives were established – and met – in order to fulfil this aim. The research objectives were designed to support the delivery of the aim and the purpose of the research, while the original research problem was driven from root definition of relevant concern, in order to make more manageable steps toward the delivery of the research objectives restated here for the purpose of clarity:

1. To establish a methodology in order to represent all stakeholders to an improvement project;
2. To develop a methodology to determine the importance of the stakeholder requirements and their relative importance;
3. To develop a means of specifying the value desired by each stakeholder;
4. To design and test a methodology that is able to inform an improvement project such that the project outcomes are aligned to stakeholder requirements;
5. To determine the utility of this methodology in improving stakeholder satisfaction with project outcomes.

Covered in sub-research problem H1.1, as ‘representing all the stakeholders at the outset of the improvement project’, **objective 1** was met first by considering the existing Lean methodologies used in service improvement in HE and identifying a gap in current published improvement methodologies. What followed was the development of stages 1, 2, and 3 of an analytical framework (the VOS-mode) to provide a representation of stakeholder in the pre-project phase.

Objective 2 was met through the further develop of VOS-model to firstly describe the complexity of stakeholders’ requirements and their relative importance. This was covered in the sub-research problem H1.2, as ‘establish a formal process to capture and elicit all the stakeholder expectations’

and was met by development of Stage 4 in VOS-model was designed specifically to elicit and capture attributes from the all stakeholder in a matrix building on from the previous stage 1, 2 and 3.

Sub-research problem H1.3, as ‘a formal process to quantify, prioritise and balance stakeholders’ expectations in order to streamline the value flow in a structured manner’ was addressed – and the objective fully met – by the development of two further stages; Stage 5 and 6 in VOS-model, developed to select the key attributes in a critical, standard and systematic manner across all of the stakeholder to create a balanced and prioritised representation of the Voice of Stakeholder (VOS).

Objective 3 was covered in the sub-research problem H1.4, as ‘the defined balanced requirements to be used to guide optimisation of service effectiveness to ensure meeting the existing and emerging needs’. This objectives was met through the development of the final stages of the VOS-model; stage 7 and 8. These final two stages in the 8-stage VOS-model identify and confirm the alignment of stakeholder requirements to the previously agreed business needs and provide a set of streamlined requirements (defined value-drivers) to inform the identification of the service ‘gap’ between what is delivered currently and what is actually required (the expected output) of an improvement project.

While empirical research informed the development of the VOS-model and confirmed the potential to improve the delivery and sustainability of an improvement solution, **objective 4** was met by subsequent testing of the VOS-model with a number of differing projects of varying complexity and service delivery requirements. Application of stage 1 through to 8 of the model in each case resulted in the delivery of a solution at the pre-project phase that was more detailed and provided more informed view of the project requirements.

The selection of improvement projects having strategic, tactical and operational level focus confirmed the utility of the model while quantitative project outcomes – final and interim and qualitative stakeholder feedback confirmed the meeting of **Objective 5**.

The areas in which this research provides an original work and significant contribution to knowledge are;

- An extensive review of literature related to Lean, Service improvement, and Stakeholder management as the main topic of research investigation. The study was not only on introducing what counts as knowledge in the area of discourse, but also a critical review of prior research which motivated and justified the research problem statement.
- Proposing a framework (i.e. diagnostic questions) for the critique of existing models, frameworks, and approaches towards service improvement.
- Devising a research methodology framework incorporating both Checkland's soft system and Meredith's research cycle and demonstrating utility through use.
- Designing the VOS-model as a navigation framework, this proposed strategic level thinking on how to specify value desired by multi-stakeholder within the HE service, with simplifying the complexity without the loss of fidelity.
- An application framework that focuses on the 'co-creation' of the value within improvement project (HE), which helps the improvement project to work on clear expectation, and less ambiguity regarding value definition. In order to better inform and guide management of improvement projects through;
 - Agreeing whether or not there is sufficient justification to proceed with the project, i.e. feasibility of the project;
 - Ensure a firm and accepted foundation to the project from the stakeholder prior to commencement of the work;
 - Provide the baseline for decision-making processes required during the life-cycle of project implementation.

While the application of the VOS-model may have wider utility beyond the applications study, these conclusions relate only to Universities recognising Lean as a business improvement strategy and employing improvement projects as a means of delivering an improvement in service levels.

Further work

10.1 Further related research

A number of interesting areas for further research on related areas were emerged from the research:

- While the VOS-model showed its utility, however it is a directed framework. In order to make the framework self-administrated for project manager and stakeholders, further work is required to create a work-book and an application accommodating the VOS-model stages.
- Implementation of the VOS-model in a range of recent government policy fields, for example:
 - Internationalising HE to ensure that UK remains globally competitive to reveal the opportunities available to work with international partners and develop global employability skill for both home and international students.
 - Enhancing the quality of the student experience, which was outlined the government plans in white paper 2011 to raise the standard of student experience, provide greater choice for students, and make universities more accountable.
- Expanding the research to other HE organisations; - by being able to apply the VOS-model in different range of service provided by the HE organisations.
- Expanding the research to other Service organisation and evaluate the utility of the VOS-model in a wider service improvement.
- The VOS-model to be run by project leaders/managers in the improvement project in HE service.
- While there is no intention that the VOS-model directly change the culture but it can lead on assessing the result of the use of the VOS-model with the extent to the change on the culture.
- Measuring Future Value by implementing the VOS-model, as an intangible and intellectual capital in HE Service; - Investigating how the concept of future value can be explained for HE Service and measured the operation after the VOS-model implementation to propose a more concrete future value for the business.

Meanwhile the papers published by the researcher in the area of Lean were (refer to Appendix 24);

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Appendix 1 *UK HE contribution to GDP*

Overall impact of the higher education sector on UK output, 2011-12				
OUTPUT				
Direct output	£27.92 Billion	0	0	£27.92 billion
Secondary output	£37.63 Billion	£7.37 billion	£0.19 billion	£45.19 billion
Total output generated	£65.55 Billion	£7.37 billion	£0.19 billion	£73.11 billion
UK HE contribution to GDP				
	Universities	Off-campus expenditure of international (all non-UK) students	Off-campus expenditure of international (all non-UK) visitors	Higher education sector
Direct GDP	£17.97 Billion	0	0	£17.97 billion
Secondary GDP	£18.43 Billion	£3.42 billion	£0.09 billion	£21.94 billion
Total GDP	£36.40 Billion	£3.42billion	£0.09 billion	£39.91 billion

Table A. UK HE contribution to GDP

Appendix 2 *CUBIT*

The CUBIT started by training the lean concept while the example of industry was provided in between of each step following by discussion on their current situation in their specific area. The CUBIT had the flexibility of both offering training as well as a chance of having a workshop for Rapid Improvement. The workshop was facilitated by internal staff from Engineering & Computing faculty. The workshop is managed in the preparation phase, during the event itself and in the follow-up phase. The use of Rapid Improvement Workshop (RIW) made the staff able to understand the process, they were part of it and discuss on potential opportunities and savings as well as a chance to have their voice heard.

The first question asked was what staff put as “value” from students' point of view; the answer got divided into two main sections; education section and facilities.

- Facilities, IT, Technology
- Consistence service across the university
- Quality teaching which gives value for money
- Availability of courses
- Accessibility

Next step was to review the cases on each area by asking a set of questions, in an interview base The first question asked was what staff put as “value” from students' point of view; the answer got divided into two main sections; education section and facilities.

- Facilities, IT, Technology
- Consistence service across the university
- Quality teaching which gives value for money
- Availability of courses
- Accessibility

Next step was to review the cases on each area by asking a set of questions, in an interview base;

- What things keep you from doing your work?
- What is something you should not have to do?
- What would make your work easier?
- What are the activities which don't add value to your work?
- Why have you done it? And how long does it take your time?

Area	Business development
Problem	A process which fits the new product i.e. CPD (cell process design)
Reason/Why	Each product is new & there isn't any model to refer to
V.A for Uni	If the problem gets solved, they can sell more quickly and to more people
Customer	External industry

Table A. BDSO, new product

Based on the short interview the university is the last EODB (ease of doing business) for companies to refer to, if they face any problem. Therefore, attracting and convincing business might not be easy to start. The projects are different and do not follow a single pattern.

Area	Online registration, Operational part to manage
Problem	The timetabling of approximately 250 Add+vantage module takes considerable time (90days) and involves a number of cross faculty functions
Why	Chasing the academic staff for getting information as they don't realize it as their responsibility
V.A for Uni	A lot less time will be taken if the running courses can get it right first time
Customer	Students

Table B. Add+vantage group, online registration

For finding out how long actually the whole process takes, current state of the process was mapped.

Following to the mapping we held an interview and went through the 5Whys route;

- Why does the timetabling process take such a long time (90days)?
 - Mainly due to the delays. Why?
 - Waiting for departments to send required timetabling info to the team, chasing departments and then clarifying information, Why?
 - The timetabling module process is not a priority for them, Why?
 - Department are not accountable for the process, Why?
 - Add+ is only a 12th of the degree course and the process is co-ordinated by add+team.

By continuing the asking why's it is found out as the concerned department and timetablers will not see the Add+ timetabling as a priority and being accountable, they do not put any effort to meet the deadline and in result the chasing process keeps moving on. In result responsibility matrix with specific deadlines was raised as a solution which decreased the total process time from 90days to 35 days.

Area	Customer Service supervisor/admin (Estate department) (32 student houses+ Lecture halls+ offices)
Problem	Help desk staff are spending a great deal of time chasing up wrong or inadequate information before being able to log a maintenance request or deal with other bookings. Estates are committed to enhancing the students' experience and staff expectations by providing a pleasant, clean and safe environment for study and work. Any delays in being able to record a request or deal with an enquiry in the initial stage will cause a buildup of tasks.
Reason	The need for better information flow and communication is required There isn't any specific set of question which customer can refer to fill either for Maintenance, Van rent, or transport. The service provided is not classified.
V.A for Uni	Less time to look for information while be able to supply right information, better service to the customer.
Customer	Anybody within the university

Table C. Estate department, customer service

After mapping out the process and going through the 5Why's it is realized a set of standard questions on the website for each service that they provide, which will be required by customer to fill, would solve the problem.

Area	IT procurement for the whole university; Budget, analysis of spending, and recruitment
Problem	Bottleneck in the process because of the centralization
Reason	Centralization done, but there isn't any standard process communicated across the department on how the new centralized procurement works.
V.A for Uni	The process will be streamlined, have a chance for better negotiation with supplier, as well as better inventory control.
Customer	Every faculty / professional + IT team And above all associate dean

Table D. IT departments, Procurement

The result of the overview of the procurement process was streamlining the process by removing duplication and having forecast of spending on a specific time from all departments would remove the waste from the system, as well give the ability to negotiate with suppliers. The action to take was having a meeting with different areas in the beginning of the year and asks them for a plan and pre-approved it.

Area	Software programming, "UNIVERSE". Works on how to facilitate the relation between the university and technology.
Problem	Merging student information in student records by mistake
Reason	The problem happened a few times and it removed the whole information about the student and the risk of it happening again is high
V.A for Uni	1- Service students better 2- Remove the wasted time on sorting out the problem 3-process will be more efficient
Customer	Students

Table E. IT department, Software programming

After mapping the process it was asked is the problem coming from human error or system complexity. The answer was human error. The current process was defined clearly therefore instead of changing the process by training the user as well as removing the blame culture. The mistake proofing checking was the next step which can be added to the system before saving or removing any information.

Appendix 2.1 *CUBIT BDSO*

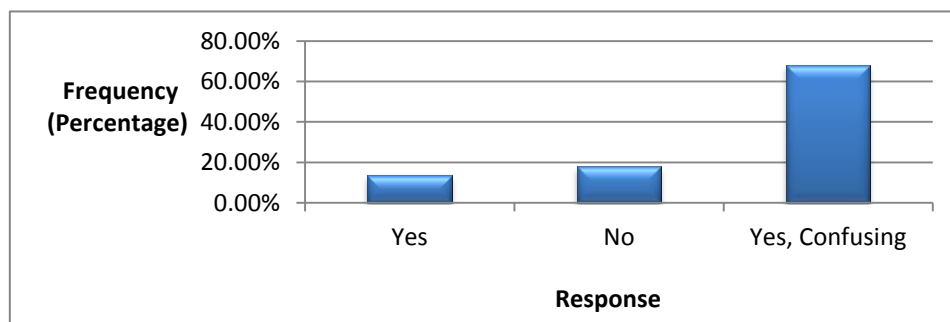
Based on problem statement it was aimed for improvement to enable PI's to purchase for their projects with minimal bureaucracy and maximum efficiency. Set of questions were asked from BDSO team to quantify the problem as well as review their satisfaction as an internal customer of the subsystem of the whole University system such as;

1. Are you aware of the current AR, purchasing process of all goods?
2. How long on average does it take you to order; IT equipment's, Furniture, Conference bookings, Travel (accommodation), Consultancy invoices, Marketing items, and other consumable items?
3. How long on average would you like it to take to order the items?
4. What are the possible causes of delays in ordering goods for projects?
5. What process improvement do you think would have impact for Applied Research?
6. What do you rate the AR, purchasing process?

The list of problems continued to be reviewed and solution acceptable for team raised and discussed for each. By removing duplication the variety of process, reduced and the standardised process replaced it. The result was by applying changes in the process, there will be a standardised and transparent process and system in place and better PI communication.

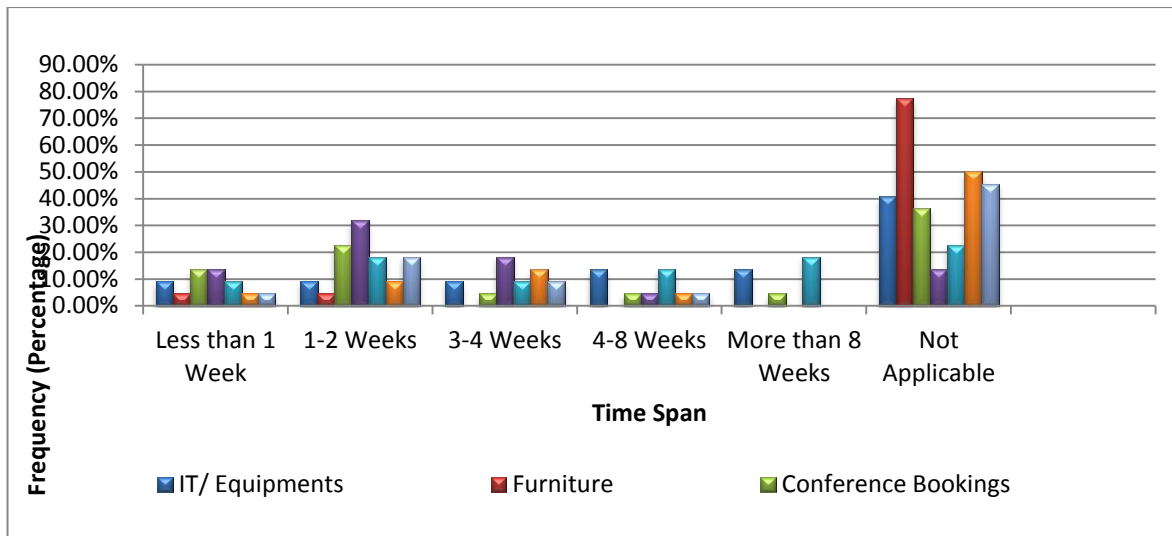
Set of questions were asked from BDSO team to quantitative the problem as well as review their satisfaction as an internal customer of the subsystem of the whole University system.

1. Are you aware of the current AR purchasing process of all goods?



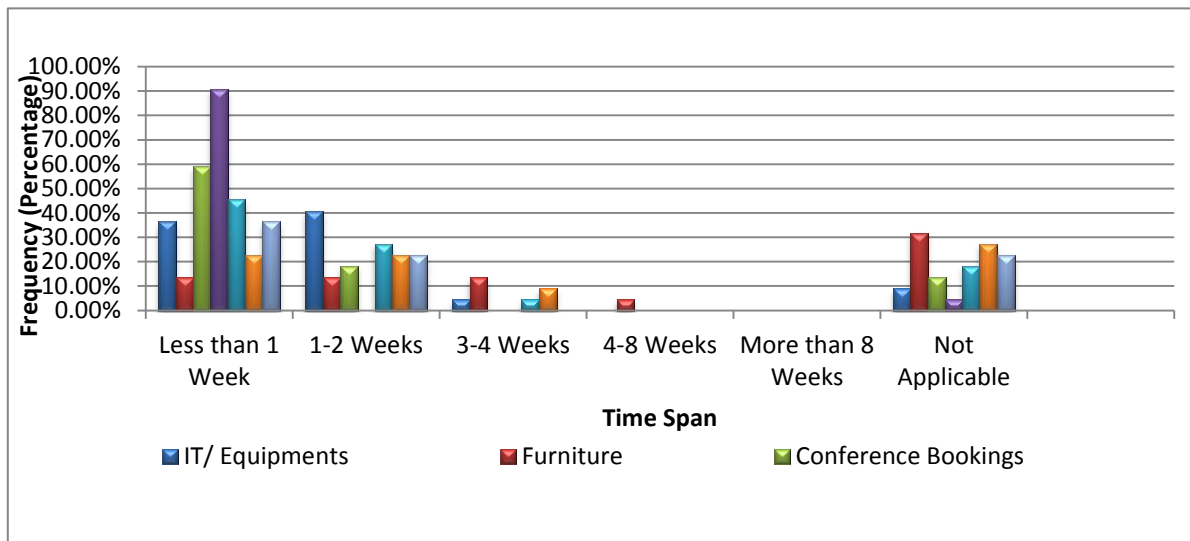
AR purchasing process awareness

2. How long on average does it take you to order; IT equipment's, Furniture, Conference bookings, Travel (accommodation), Consultancy invoices, Marketing items, and other consumable items?



Average time it takes

3. How long on average would you like it to take to order the items?

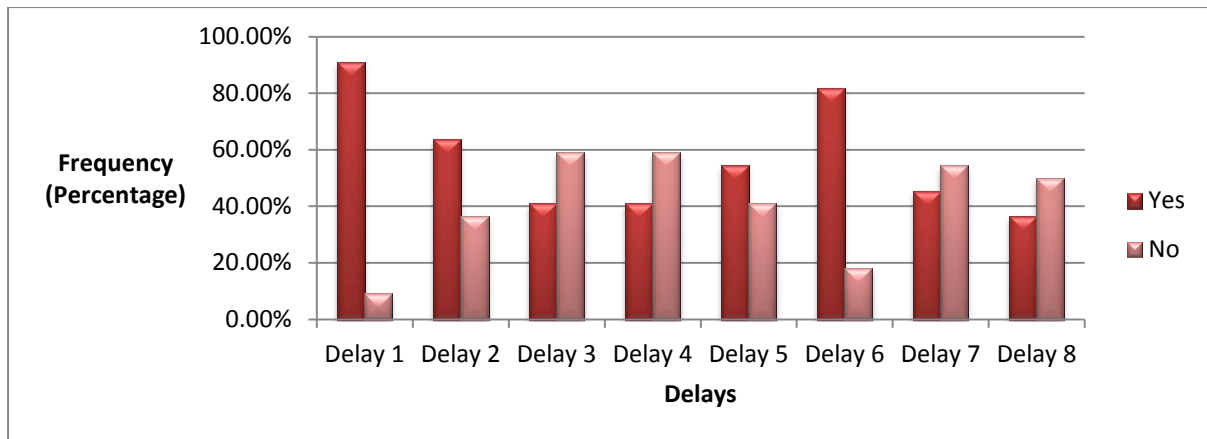


Average time it expected to take

4. What are the possible causes of delays in ordering goods for projects?

- Delay 1:** - Not knowing who to contact for what **Delay 2:** - Not aware of the budget codes/ having to ask for the Budget codes
- Delay 3:** - Not aware of who authorizes the order **Delay 4:** - Authorized budget holder is not available
- Delay 5:** - Not aware of process of ordering **Delay 6:** - Too many departments involved in ordering
- Delay 7:** - Not knowing what is eligible to order **Delay 8:** - Too many forms to complete in the ordering process

Delay 1 and 6 had the highest mark between the others.



Delays marks

5. What process improvement do you think would have impact for Applied Research (AP)?

Improve_1: - Training/ understanding of the AR purchasing process

Improve_2: - Simple purchasing flowcharts available

Improve_3:- Only one department to deal with

Improve_4:- Better communication

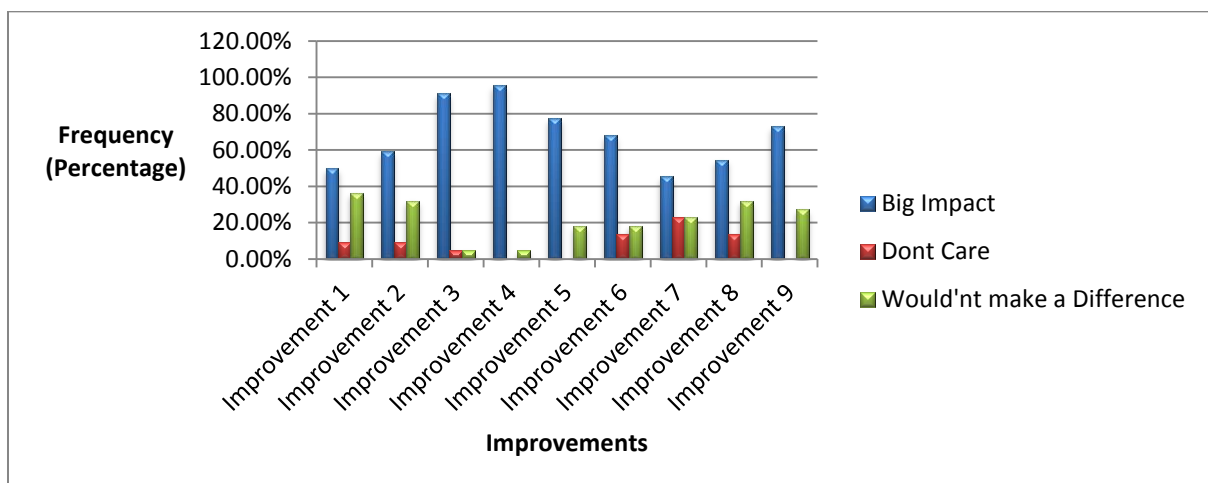
Improve_5:- Fewer signature/ authorizations required

Improve_6:- Introduction of OMIS in the AR area

Improve_7:- Fewer forms to complete

Improve_8:- Project start-up meetings to include purchasing plant

Improve_9:- Quicker notifications of budget codes



Improvements impact

6. What do you rate the AR, purchasing process?

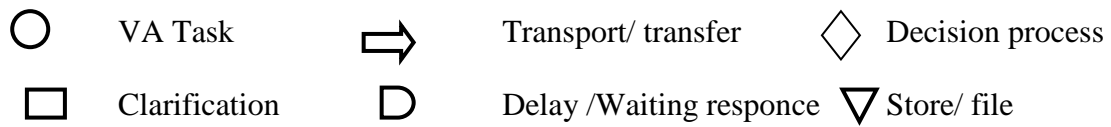
45% rated poor, 50% rated average and only 5% rated good, surprisingly that with having low satisfaction from the process still everyone was busy doing it every day.

With having low satisfaction from process on serving the purpose the root causing analysis workshop was the next step, which we used the “5whys” for it.

1. Problem - PI often unable to source correct form
↳ don't know where to look
↳ no one has shown me
↳ not part of the AR process
↳ someone else always did it for us
Solution: make it part of the AR process guide
2. Problem - Form does not cater for all departments/entities
↳ every department does things their way
↳ instructions interpreted differently by different faculties
↳ no central responsibility when implementing process
Solution: Propose single form which is centrally owned (retrain users in new one way) do not allow faculties to interoperate
3. Problem - Forms not completed with full details/correct information so unable to process
↳ did not know it had to be given
↳ not trained in filling out form
↳ no training given as part of the AR process
Solution: make online form force details to be given, offer AR training on process to PI etc.
4. Problem - Unclear on roles and responsibilities i.e. who completes the forms (Assistant Account or PI)
↳ different faculties do things differently
↳ no one central process
↳ departments faculties allowed to interoperate how to do thing
↳ no central control
Solution: Propose single form which is centrally owned (retrain users in new one way) do not allow faculties to interoperate
5. Problem - OMIS limited to BES / AD
↳ Pilot in only these two departments
↳ other faculties not asked or involved
↳ testing to make sure it works
Solution: either abandon OMIS or make it the single point across the university
6. Problem - Limited suppliers listed on form drop down menu

↳ system has only limited capacity
↳ only built as a test facility for two schools
Solution: increase the supplier base on the system to all approved suppliers.
7. Problem - VAT rate incorrect
↳ don't know which one to apply
↳ no process rules set to help decide
↳ everyone in each faculty new which one to set
Solution: identify common VAT rates for common projects and issue as part of the process.

Activity Current state:



Activity Description	○	□	⇒	D	▽	◇	Time	Dist.
1. Work out which staff and faculties (time sheets/ project file)						X	30 min	
2. Request from BDSO to Fin Acc(s) (email)			X				5 min	
3. Wait for response from Fin Acc(s)				X			2 days	
4. Fin Acc(s) checking access to data		X					5 min	
5. Getting data if not got				X			2 days	
6. Fin Acc(s) filter data	X						15 min	
7. Sending back relevant data from Fin Acc(s) to BDSO			X				5 min	
8. waiting to be accessed				X			½ day	
9. Inputting data into SCA/ Claim	X						10 min (max)	
Note: 1 day = 7.5 hours								
Total process time in mins							2095	
VA:NVA ration (mins) 1:84								

Activity Future state:

Activity Description	○	□	⇒	D	▽	◇	Time	Dist.
1. Work out which staff and faculties (time sheets/ project file)						X	30 min	
6. Fin Acc(s) filter data	X						15 min	
9. Inputting data into SCA/ Claim	X						10 min (max)	
Note: 1 day = 7.5 hours								
Total process time in mins							55 min	
VA:NVA ration (mins) 1:2.2								

SIPOC- PROJECT CLOSURE PROCESS

PROJECT CLOSURE PROCESS					
SIPOC	S	I	P	O	C
	BDOS	System Information	BDSO Finance and ADM involve in the process.	Project formally close and Files archived	<ul style="list-style-type: none"> ▪ University Auditors ▪ External Auditors ▪ PIs ▪ BDSO Finance.

▪ Check Input:

- There are no delays and waste related to the inputs as the information comes directly from the system.

▪ Check Process:

- Rework has been identified in the first part of the process (checking deadline process by BDSO and then BDSO Finance).
- Many projects are waiting to be closed for a long time (Codes could be closed?)
- No authorization to close codes (currently a request is needed to another department to close the codes)
- QLX System does not show up-to-date bid end dates (They are working on linking the two systems so the bid's end dates can be automatically update).

▪ Check Output:

- Missing information
- Inconsistency in electronic archives and paper files (document management issues)
- Lack of Feedback
- Lack of communication to stakeholders (PIs and funders) to inform them about project closure

Appendix 3 St Andrews Lean 8 steps process

Appendix 4 *University of Tennessee process flowchart in college of engineering after applying Lean*

Appendix 5 *Introductory letter for interview*

Dear xxx

I am currently researching Management of Service in Higher Education. This initial work is part of a doctorate I am undertaking with Coventry University.

It is proposed to study the Lean applicability in service section of HE to develop a number of case studies which will be used to support the doctoral research. Because you have been currently involved in improvement within your area of service in the University, I am inviting you to participate in this research study by a short interview on the phone or in person (depending on your availability and preference).

The interview will require approximately 30min to complete. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, I will not include your name. Copies of the project will be provided to my Central Coventry University instructor and Director of study. If you choose to participate in this project, please answer all questions honestly. Participation is strictly voluntary and you may refuse to participate at any time.

Thank you for taking the time to assist me in my educational endeavours. The data collected will provide useful information regarding educational publication as well as a report to evaluate and track the progress and success of the key areas. Completion of the interview will indicate your willingness to participate in this study. If you require additional information or have questions, please contact me at the number listed below.

With very kind regards,

Gazelleh Moradi
Graduate Intern, PhD Student - Engineering and Computing Faculty
Coventry University
E-mail: moradizg@uni.coventry.ac.uk
Mobile; xxxxxxxxxxxx

Appendix 6 *Evaluation of the improvement Survey*

Evaluation of the improvement

A. Improvement

1. Which area been improved?
2. How has it been improved?
3. What method been used? And the key reason on why the method of improvement been selected?
4. Why did it require improvement?
5. For how long the improvement has been in place?
6. What are the long term aims on improvement? Have you achieved it?
7. Is there any standard process in place for all improvements take place?
8. What was the value in improvement?
9. How was the value been decided?
10. How has the value been communicated?

B. Service improvement focus categorisation

11. Do you categorise your service
 - A. Customers
 - B. Stakeholders
 - C. Strategy or
 - D. Process base
12. Why is that?
13. What is the service you provide specifically in this improved process?
14. What is the level of its complexity?
 - A. Very Complex; numbers of stakeholders with number of functionality involved
 - B. Simple with few complex step; Few stakeholder, number of functions involved
 - C. Simple; Few stakeholder, only one function involved
15. How often does it repeat?
16. Who specifically does your service support;

- A. Customer (specify)
- B. Government
- C. Supplier (specify)
- D. Wider range of university
- E. Staff
- F. Other (specify)

17. Who are your main stakeholders/ Customers for your service?
18. How do you understand your stakeholders' requirements?
19. Does stakeholders/customers requirements aligned with each other?
20. What is the impact of it on your day to day and improvement decision making?
21. How do you communicate with your stakeholders?
22. Do you get All your stakeholders involved in improvement? If so in what level of detail and when?
23. How effective was the improvement towards the stakeholders' satisfaction?
 1. Very effective
 2. Effective
 3. Neutral
 4. Un-effective
 5. Very ineffective
 6. Don't know
24. If you selected 3, 4 or 5 why? (otherwise move to Q.25)
25. How have you assessed the effectiveness of improvement? (Is there any measure in place to confirm that?)
26. Have the improvement enabled the area of your service to meet customers requirement better?

C. Implementation

27. What activities are being undertaken as part of the implementation?
28. What proportions of stakeholder from the service area are currently involved?
 - a) Fewer than 10%; Only process-owner

- b) 10-50%; process owner, customer OR back-office staff
- c) 50-75%; process owner, customer and back-office staff
- d) More than 75%; all the service stakeholders

- 29. Does the process exceed the area of the service to any other part of the university?
- 30. What types of stakeholder are involved in the improvement?
- 31. What strategy being used to involve/engage stakeholders' in improvement?
- 32. What training and development is being provided to stakeholders?
- 33. Any specific tools and techniques been used? Are they new to you?
- 34. Was the improvement based on internal or external consultant?
- 35. Are you developing your own in-house improvement facilitators?
- 36. What drives your CI?

Appendix 6.1 *Evaluation of the improvement Case 1*

Coventry University Library

A. Improvement

1. Which area been improved? Shelving activity on returning books to the shelves.
2. How has it been improved?

The methodology used was to invite an external consultant. We had 3days of process improvement workshop, which introduced us tools can be used for improvement. Then we looked on the problem and designed the more efficient process.

3. What method been used? And the key reason on why the method of improvement been selected? Basic Version of Lean Six-sigma, i.e. Process mapping, SIPOC, 7wastes, Histogram (for looking on where is the peaks).

Consultant explained why it needed to be used.

4. Why did it require improvement? We thought the period it took us to take the books back in shelves is too long, and the measure to prove that was the number of trolleys waiting.
5. For how long the improvement has been in place? It has been there almost for an academic year.
6. What are the long-term aims on improvement? Have you achieved it? The core aim is to return the books to shelves within 24 hours. We are not meeting it yet and need to review why.
7. Is there any standard process in place for all improvements take place? There is standard operation in place which doesn't reply well because of staff and resource number availability (the number decreased) and resources on peak time. Improvement is in place, now that small changes made we are looking to make a model for following improvement.
8. What was value in improvement? Time, speed of activity, minimise the shelving time
9. How has it been decided? KPI, the benefit of affected the key stakeholders: i.e. staff, student, library manager. We monitored the process 30-40 trolleys were waiting and we realised the bottleneck.
10. How has it been communicated? We communicated with staff but not customers. Workshop reinforced the objectives, following of workshop we briefed the staff, and then we had further meeting on their roles and responsibility for implementation of the improvement.

B. Service improvement focus categorisation

11. Do you categorise your service
 - A. Customers
 - B. Stakeholder
 - C. Strategy or
 - D. Process base
12. Why is that? Improved service was customer base. It is customer lead as servicing the customer is our core business aim if we don't deliver we should be questioning our service.

13. What is the service you provide specifically in this improved process? It is “return to shelf” service i.e. return book to the correct location.
14. What is the level of its complexity?
- A. Very Complex
 - B. Simple with few complex step
 - C. Simple
15. How often does it repeat? Multiple times daily
16. Who specifically does your service support;
- A. Customer (specify) STUDENT
 - B. Government
 - C. Supplier (specify)
 - D. Wider range of university
 - E. Staff
 - F. Other (specify)
17. Who are your main stakeholders/ Customers for your service? Staff/ Student
18. How do you understand your stakeholder requirements? Student union, Student focus group, Department/Faculty board of study. We prefer to get the student body voice rather than single person voice.
19. Does stakeholder requirement aligned with each other? If the voice comes from group, e.g. Student focus group their wants not necessary clash all the time.
20. What is the impact of the clash/alignment on your day to day and improvement decision making? If the customer requirement is aligned with our core business we check and do our best to improve the service towards the fulfilment of it, but if it is outside of our core business we deal with it separately and one off. It would have effect on what other staff doing.
21. How do you communicate with your stakeholder? For general feedback; we have a forum, I met student union yesterday which we use for feedback, and student representative can visit us as well if there is any issue to be raised.
22. Do you get all your stakeholder involved in improvement? If so in what level of detail and when? No, and the reason is they need different things and developing a system that reply to extreme demand is demanding and costly. We need to balance the budget and resource with the needs which goes up.
23. How effective was the improvement towards the stakeholder satisfaction?
- 1. Very effective
 - 2. Effective
 - 3. Neutral
 - 4. Un-effective

- 5. Very ineffective
 - 6. Don't know
24. If you selected 3, 4 or 5 why? (otherwise move to Q.25) Don't know, we don't have stakeholders' satisfaction measure before and after. We don't have any way to measure that beyond the enigmatic. If there is any issue there is box placed in Library which students/staff can put their issues in. There is a data base for recording and registering these issues (only library staffs have access to look at the data base) the action aimed to be taken within 5 working days.
25. How have you assessed the effectiveness of improvement? (Is there any measure in place to confirm that?) By comparing with the aim
26. Have the improvement enabled the Library to meet customer requirement better? It has yes, as a professional expertise we aimed for 24 hours of return to shelve (not meeting it yet)

C. Implementation

27. What activities are being undertaken as part of the implementation?
- Once we decided and designed the solution, action plan made, (The solution was made from our point of view, because we operate it and it needs to be operationally viable. However we had customer in mind,
 - assigned responsibility (10 staffs who represented all area of the process),
 - arranged brief session with staff,
 - communicated with other staff who might have been effected,(physical change was few),
 - Map the operational interaction,
 - running through the procedures,
 - Implementation review; Daily, to Weekly and now it's only after the peak
 - Made some adjustment to staff model; i.e. by planning in advance for peak time if it's predictable and if it's not used the flexible staff to call them in when needed.
28. What proportions of stakeholder from the service are currently involved?
- a) Fewer than 10%
 - b) 10-50%
 - c) 50-75%
 - d) More than 75%
29. Does the process exceed the area of the Library to any other part of the university? No
30. What types of stakeholder are involved in the improvement? 10 staffs that represent all area of the process.
31. What strategy being used to involve/engage stakeholder in improvement? There wasn't any specific in place for engagement really, we discussed the core staff why the change needed to take place and then formed the action group (stakeholders of the process from providing end service), the resistance was few. The main reception was pushing the work to the next

level of process and then indicating we have done our bit and have collected the books from student in reception. We moved from this to team effort.

32. What training and development is being provided to stakeholder? 3days for core projects group, we ourselves briefed the whole staff.

33. Any specific tools and techniques been used? Are they new to you? Process mapping, SIPOC, 7 wastes Histogram. Yes we got trained on them.

34. Was the improvement based on internal or external consultant? 3days training from external consultant.

35. Are you developing your own in-house library improvement facilitators? We are doing it in-house.

36. What drives your CI?

- Core business ; we need to provide excellent service to customer
- There is quantitative measure on how well we achieved on what we said we are going to do
- Previous year statistics for demands peaks-and-troughs

Appendix 6.2 Evaluation of the improvement Case 2
Coventry University SAB/PAB System

A. Improvement

1. Which area been improved? SAB (Subject Assessment Board) /PAB (Program Assessment Board) system
2. How has it been improved? Old system was very paper based, secretaries had to print on broad sheets and taking them to meeting each needed to be hand authorised, and any change on each meant to redo the whole paper base process. The system changed to web-based application, which enabled us;
 - to have meeting on projectors,
 - statistics can be downloaded
 - Amendment can be done live
 - It is connected to “Universe”²
3. What method been used? And the key reason on why the method of improvement been selected?
 - Business Analysis; step-by-step (low level) of the process been analysed, Swim lane diagram, dependency and how many times the information been passed, as well as the future map

The reason on why these method been used was the Knowledge and experience of the external contractor.
4. Why did it require improvement? Admin staffs Time, Academic Time, External academic Time spent on the paper process in total was over £100K, so we decided the need to slim down the process based on Time and Cost factor.
5. For how long the improvement has been in place? The project ended 2years ago, but since the implementation started it's been a 6 month now.
6. What are the long term aims on improvement? Have you achieved it? Yes, Old system had effect on student experience, but the new system enables the staff on as soon as they get the marks they can amend and check. This would reduce the time, and mistake as well as negative student experience.
7. Is there any standard process in place for all improvements take place? No, and the reason is it depends on the nature of the project and whether it is managed by internal or by external guidance.
8. What was the value in improvement? Reduce student complain through error reduction,
 - With more efficient and intuitive exam board &
 - Less of a drain of staff resources
 - And in general being more cost effective

² Universe is one of the standard university application

9. How was the value been decided? On the Step-by-step process analysing we realized the flawed area.

10. How has the value been communicated? We had internal meeting with the stakeholder, i.e.

- Faculty expert
- Central registry expert
- Business analysts
- External IT programmer
- Internal IT programmer

On demonstration of improvement and how to use the new system

B. Service improvement focus categorisation

11. Do you categorise your service

- A. Customers
- B. Stakeholders
- C. Strategy or
- D. Process base

12. Why is that? The main drive is customer and it has been identified through the process

13. What is the service you provide specifically in this improved process? It is a service providing to Academic (staff), Professional services staff (Admin), and students which enables them to get statics electronically, run meeting on electronic version of documents, and less error on results.

14. What is the level of its complexity? It was A now its C

- a. Very Complex
- b. Simple with few complex step
- c. Simple

15. How often does it repeat? On average the Standard undergraduate, twice a year, and standard Post graduate 3times a year

16. Who specifically does your service support;

- A. Customer (specify) **Student**
- B. Government
- C. Supplier (specify)
- D. Wider range of university
- E. Staff
- F. Other (specify)

17. Who are your main stakeholders/ Customers for your service? **Staff and Student**

18. How do you understand your stakeholders' requirements? As a part of the analysis of the process we looked at student feedback through;

- Reception query
 - Directly to admin support
 - Tutor or lecturers
 - Chairs action set up to fix an action
- & we analysed why errors taking place.
19. Does stakeholders' requirements aligned with each other? Yes, staff does the input and review to the system and it expected to be accurate and efficient. On the other hand Students get the output and they expect it to be ASAP and accurate.
20. What is the impact of it on your day to day and improvement decision making? Previously we had to get marks from academic, now they put the marks directly to the system. No print required either, and marks can be checked and amended even 30min before the meeting which help us to be accurately as possible.
21. How do you communicate with your stakeholder? Face-to-face, email, Moodle, student forum meeting, personal tutor meeting
22. Do you get all your stakeholder involved in improvement? If so in what level of detail and when? The process that improved was behind the scene, therefore we didn't involve our stakeholders and customer directly but looked at the area of concern and corporate it on the improved.
23. How effective was the improvement towards the stakeholder satisfaction?
1. Very effective
 2. Effective
 3. Neutral
 4. Un-effective
 5. Very ineffective
 6. Don't know
24. If you selected 3, 4 or 5 why? (otherwise move to Q.22)
25. How have you assessed the effectiveness of improvement? (Is there any measure in place to confirm that?) Less negative feedbacks and the improvement speeded up the exam board which in result made the result to be released quicker.
26. Have the improvement enabled the area of your service to meet customer requirement better? Yes, by releasing the result quicker and more accurate for students.

C. Implementation

27. What activities are being undertaken as part of the implementation?
- Team of business analyst; internal faculty expert and external consultant analysed the process
 - Review of the process as it is and as it needs to be
 - Business analyst and Faculty expert designed the new process

- IT specialist got involved to make the designed process translated to an application
 - Programmer to work on relevant screen step by step as it was getting developed by Business analyst and Faculty expert
 - Faculty expert test it from user point of view
 - Amendments made
 - Start the same process on next step for next screen do be developed
 - Communicate the new system
 - Training and introducing the new system
28. What proportions of stakeholder from the service area are currently involved?
- a) Fewer than 10%
 - b) 10-50%
 - c) 50-75%
 - d) More than 75%
29. Does the process exceed the area of the service to any other part of the university? Yes, the whole university i.e. every faculty
30. What types of stakeholders are involved in the improvement? More admin, IT, and process improvement team (Business analyst)
31. What strategy being used to involve/engage stakeholder in improvement? Using different method of training
32. What training and development is being provided to stakeholder? Training manual created, online video, training rolled out to the faculties, separate training for academic, review document made as a reminder on how to do it.
33. Any specific tools and techniques been used? Are they new to you? Mainly Swim lane (which we got training on it) and Web based techniques which were IT and Programmer responsibility and no training was required for us.
34. Was the improvement based on internal or external consultant? External
35. Are you developing your own in-house improvement facilitators? IT is continuing to do so, by having meeting with registrar every two week for getting feedback and identifying area of improvement.
36. What drives your CI?
- Feedback from student experience and
 - Business need of university based on the changes on
 - Money
 - Staff
 - Resources

Appendix 6.3 Evaluation of the improvement Case 3

Coventry University BDSO Payroll

A. Improvement

1. Which area been improved? Staff cost, obtaining payroll data
2. How has it been improved? The problem: we didn't get the payroll data consistently. From HR the payroll gets split based on faculty and that get to assistance accountants within BDSO and then the project staff had to get data from 3 different accountants. In this situation there is a risk of not being able to get the required data if someone in HR or assistance accountant in BDSO was sick.

We improved the process in two different ways;

- Made it consistence; check the process from HR to find out who the payroll information is sent to. In some cases surprisingly realised one case been sent to 3 different assistance accountants and some of them has not got any responsible person allocated to it.
 - Automated the system; added a new part to be link to BIDS (data base of the projects) system, so that everyone i.e. project manager and assistance accountant can have access to the same info and the BDSO team can align people to the project and ask for data to be put in the system, while The access of data can be checked and set.
3. What method been used? And the key reason on why the method of improvement been selected? Answered in Q2
 4. Why did it require improvement? The main reason for change was the time wasting within the system, and the fact that we had to wait till the payroll realised the data is required by us.
 5. For how long the improvement has been in place? For the first part of improvement, i.e. checking the consistency 25th of October 2011 (10month) and for second part of improvement i.e. Automated system on Nov 2011 (9month).
 6. What are the long term aims on improvement? Have you achieved it? To have data available for everyone faster. As no issues been heard we assume the aim is achieved, however there are areas to improve still.
 7. Is there any standard process in place for all improvements take place? Yes, we still running A3 program for each improvement (there were 6 initial and we have 6 new in hand)
 8. What was the value in improvement? Time was the Value
 9. How was the value been decided? Because of the inconsistency it took project staff on BDSO too long to get the data required.
 10. How has the value been communicated? I don't think the value been communicated formally, but by using the new system they realised the process require less time.

B. Service improvement focus categorisation

11. Do you categorise your service
 - A. Customers
 - B. Stakeholders
 - C. Strategy or
 - D. Process base
12. Why is that? Because it is more internal, however it assists the customer i.e. PI (Principle Investigator).
13. What is the service you provide specifically in this improved process? Gathering the payroll data to complete the claims to get the income in for the university.
14. What is the level of its complexity? E.g. because we are dealing with payroll data, there is sensitivity involved and there are only certain people who are allowed to access the data, in previous system the data from HR could only get accessed by assistance accountant but in new system the assistance accountant and project manager have access.
 - a. Very Complex
 - b. Simple with few complex step
 - c. Simple
15. How often does it repeat? The need for the payroll data is 6-1 within the project/month
16. Who specifically does your service support;
 - A. Customer (specify)
 - B. Government
 - C. Supplier (specify)
 - D. Wider range of university
 - E. Staff
 - F. Other (specify)
17. Who are your main stakeholders/ Customers for your service?
 - Senior Managements; use the service to check income
 - Funders; use service to check accuracy of the claim
 - PI; require the service to make sure their project is running well
18. How do you understand your stakeholder requirements?
 - Senior Managements; They give us target on our income and we need to meet that
 - Funders; We know the expectation from the experience
 - PI; From experience and informal feedback
19. Does stakeholders' requirements aligned with each other? in this improvement there wasn't much clash

20. What is the impact of it on your day to day and improvement decision making? It took us towards all the thing stakeholder wanted

21. How do you communicate with your stakeholder?

- In case of Senior managements; They are quite removed from this improvement
- Funders; they get the data more timely now no hold up on claims. We communicate with them through email and post
- PI; the communication is based on letting them know their claims gone in via email/post as well as the monthly meeting which we have with them.
 - Plus that there is a new project in hand to work on called “PI statements”, to input finance data to PI area in BIDS system

22. Do you get All your stakeholder involved in improvement? If so in what level of detail and when? No, It was internal process and the stakeholder would see only faster outcome

23. How effective was the improvement towards the stakeholder satisfaction?

1. Very effective
2. Effective
3. Neutral
4. Un-effective
5. Very ineffective
6. Don't know

24. If you selected 3, 4 or 5 why? (otherwise move to Q.22) Because the output was expected and it frees up our time to do more for them and that is behind the scene. It has been effective but it is internal and not visible from outside of BDSO.

25. How have you assessed the effectiveness of improvement? (Is there any measure in place to confirm that?) No, there isn't any measure in place.

26. Have the improvement enabled the area of your service to meet customer requirement better? Yes, enabled to do claims more accurately and faster for funders, however it seems to be Neutral for PI and Senior Managements.

C. Implementation,

27. What activities are being undertaken as part of the implementation?

- Done A3 for problem realisation and designing the new system
- Talk with HR to get data on who the payroll been sent to
- Request them to get it updated
- IT involvement, meetings on security and sensitivity (the new system needed to be linked to BIDS system
- Communicating it to BDSO team

- Meeting with manager and cover how the system works as well as reinforcing it on agenda of meeting to check whether they use it or not
28. What proportions of stakeholder from the service area are currently involved ?
- a) Fewer than 10%
 - b) 10-50%
 - c) 50-75%
 - d) More than 75%
29. Does the process exceed the area of the service to any other part of the university? Yes, HR, Finance, BDSO
30. What types of stakeholder are involved in the improvement? IT, HR (Information managers), BDSO (Assistance Accountant, Project Managers)
31. What strategy being used to involve/engage stakeholders in improvement? Explaining what the benefit would be and getting information from assistance accountant to who should be aligned with each faculty.
32. What training and development is being provided to stakeholder? Not a lot, we assumed the system is there and people will use it. However we need to check whether they are using it.
33. Any specific tools and techniques been used? Are they new to you?
- A3 process, it was new to us at a time
 - 5whys,
 - SIPOC, Process mapping; to categorise the stages of process and highlight the waste
34. Was the improvement based on internal or external consultant? Internal
35. Are you developing your own in-house improvement facilitators? Yes, at the moment there is one person but as we do more A3's encouraging more people to get leads on improvement.
36. What drives your CI?
- Knowledge of how the mechanism of solving problem works
 - Development Performance Review (DPR)

Before when the problem came up people knew there is something wrong but there wasn't a way to work on improvement, now when the problem comes up we use A3. People are aware of issues and what to do for taking it forward.

Appendix 6.4 Evaluation of the improvement Case 4

St Andrews University estate Job Tracking

A. Improvement

1. Which area been improved? State job tracking project, maintenance work on University buildings
2. How has it been improved? Outcome of the project were everyone had a better understanding of how things works and the implication they had with other part of the university. The extra work of updating the next job and hours the job done for each person been done on paper and it took them 4hours. The 4 hours contained;
 - get the next job
 - do the actual job and close the case on the paper
 - Indicate how long did it take to do it in the paper system

In the new system the paper-base system changed to electronic system, we provided them PC and Printer witch itself saved 21min per job. In average in old system it took 44 days from telling the trades-men to finishing the job, in the new system it has decreased to 14days, which is equal to free up 4.5 trades-men. It is important to mention by the improvement no one lost the job. The next improvement planned to be done is to give the trades-men smart phone, which would save them extra time worth equal to 1.5 trades-men. The solution was pretty much theirs, but the Lean improvement team guided them in right direction.

3. What method been used? And the key reason on why the method of improvement been selected? Rapid Improvement Workshop, 5days with staff, map the process, gathering ideas, map the future and ultimate future (smart phone).
4. Why did it require improvement? Driver was the need to change the estate culture going from reactive to proactive. We needed a proactive maintenance in place, i.e. checking things before they go wrong.
5. For how long the improvement has been in place? 18months
6. What are the long term aims on improvement? Have you achieved it? Having more proactive rather than reactive approach and state can get control over their time to try to be more efficient.
7. Is there any standard process in place for all improvements take place? Yes, we have fairly standard improvement process refer to www.st-Andrews/lean , how we work section, lean project steps. However, not always everything goes through all the process, as we might need to skip training but if the case is redesigning we go through them all.
8. What was the value in improvement? 4.5 trades-man free up (i.e. salary+ full economy cost)would be the amount of £40'000 this would make the university more effective and efficient, level of the responsibility will raise, people can change and work on improvement, and respect for people which we really pay attention to.

9. How was the value been decided? Based on standard Lean fundamental; Respect for people and C.I.

10. How has the value been communicated?

- Meeting with state managers,
- and then decide who needs to be involved
- Train the state improvement team on Lean
- and then introduce them the project and what we think as solution and get their opinion on it.

B. Service improvement focus categorisation

11. Do you categorise your service

- A. Customers
- B. Stakeholder
- C. Strategy or
- D. Process base

12. Why is that? Customer because for instance if there is a broken window estate would be responsible for H&S problem, and Process because the activity built the process.

But the strategy in this case is more flexible.

13. What is the service you provide specifically in this improved process? The service contains 3 levels; -process, -training the staff, - overall culture

14. What is the level of its complexity? The process is fairly standard but people who are involved have different level of willingness to change, and involvement, therefore the process of change start very hard and finish simple. But in case of the service it is Simple.

- a. Very Complex
- b. Simple with few complex step
- c. Simple

15. How often does it repeat? Every Hour

16. Who specifically does your service support;

- A. Customer (specify) 60% Student
- B. Government
- C. Supplier (specify)
- D. Wider range of university
- E. Staff 40%
- F. Other (specify)

17. Who are your main stakeholders/ Customers for your service? Administration Unit, Academic and student, and the Suppliers to the university

18. How do you understand your stakeholders' requirements? What we didn't do was to get student, staff and supplier involved, but in the coming new projects we get the students involve.
19. Does stakeholders' requirements aligned with each other? Yes, They just wants things to work, but student are paying so they want it quicker
20. What is the impact of it on your day to day and improvement decision making? Always students wins
21. How do you communicate with your stakeholder? Face-to-face, Email, Phone
22. Do you get all your stakeholders involved in improvement? If so in what level of detail and when? We didn't in this project but we will involve specifically customer in our next projects, and this should be in same level of detail as staff member as no idea is a bad idea, and we believe in respect people in our university.
23. How effective was the improvement towards the stakeholder satisfaction?
 1. Very effective
 2. Effective
 3. Neutral
 4. Un-effective
 5. Very ineffective
 6. Don't know
24. If you selected 3, 4 or 5 why? (otherwise move to Q.25)
25. How have you assessed the effectiveness of improvement? (Is there any measure in place to confirm that?) We didn't talk to customer but based on my gut feeling saving the £40k is a good improvement towards effectiveness.
26. Have the improvement enabled the area of your service to meet customer requirement better? Yes, by significant reduction in processing Time.

C. Implementation

27. What activities are being undertaken as part of the implementation? Employing of the improvement team, they keep up the chat between themselves and we guide them to right direction
28. What proportions of stakeholder from the service area are currently involved?
 - a) Fewer than 10%
 - b) 10-50%
 - c) 50-75%
 - d) More than 75%
29. Does the process exceed the area of the service to any other part of the university? No, but the lesson learn can be

30. What types of stakeholder are involved in the improvement? Front line staffs, supervisory staff were mostly involved but the senior level staffs were put in just time to time to see the result of improvement at the time.
31. What strategy being used to involve/engage stakeholders in improvement? Getting to know them , tell them about our experience, telling stories, increase level of trust
32. What training and development is being provided to stakeholder? If the Lean was a new subject to them start with; Introduction to Lean, Lean training to Manager, Lean training to Admin, Problem solving, Lean thinking, Lean tools, Managing change
33. Any specific tools and techniques been used? Are they new to you?
- BOSCARD (Background, Objectives, Scope, Constraints, Assumptions, Risks, Deliverables),
 - Process mapping
 - Nominal Grouping Technique
 - Analytical tools like SIPOC
 - Mind mapping and Rich pictures
 - Matrix prioritisation
 - Visual management
 - Quad of aims
34. Was the improvement based on internal or external consultant? Internal
35. Are you developing your own in-house improvement facilitators? The Lean Team involves potentially... everyone! The aim of Lean is to involve all members of staff across the University in continually improving their own processes.
- So far over 200 staff from every School and Unit has been involved directly in at least one Lean project, with many more staff having been consulted in the process of redesign and assisting in the implementation of projects coming from Lean.
36. What drives your CI? Economic situation, Competition from other universities, the Aims university set for itself, which all are aligned with whole lean idea.

Appendix 6.5 Evaluation of the improvement Case 5

St- Andrews University, Cataloguing Books Project

A. Improvement

1. Which area been improved? Cataloguing books in Library
2. How has it been improved? 3month of new books backlog to be catalogued. On average staff could do 2 books/hr and with cut out the interruption they could do 3books/hr. The aim was to catalogue all the books in 1day rather than 3months, and the reason behind that was the books were blocking the lights and taking place in library and also the level of staff stress was rising day by day to the increased backlog. On 2009 there was a boost on budget to buy books, and last summer library had to change the floors which slowed down the system, and the system in place helped them to manage the situation.

The outcome of the project was the person can do 3books/hr and we needed to employ a cataloguing staff member for short time. We realised the process itself isn't the problem the problem was the resource allocation, in which manager couldn't dedicate a staff to do only the process.

3. What method been used? And the key reason on why the method of improvement been selected? Rapid Improvement Workshop, 5days with staff, map the process, gathering ideas, map the future
4. Why did it require improvement? Because light was blocked, students couldn't access the book and as the library database was showing the book is available they needed to search for it and then wait for 20-30min till the book gets catalogued before they can take it. The books were like an inventory with the negative effect of money tides up.
5. For how long the improvement has been in place? 4years.
6. What are the long term aims on improvement? Have you achieved it? The aim was to get the books available within 24hrs for students but we had to go down to 2days because of other process impact on the system.
7. Is there any standard process in place for all improvements take place? Yes, we have fairly standard improvement process refer to www.st-Andrews/lean , how we work section, lean project steps. However, not always everything goes through all the process, as we might need to skip training but if the case is redesigning we go through them all.
8. What was the value in improvement? £80'000 worth of stock which people couldn't access instantly.
9. How was the value been decided? Based on standard Lean fundamental; Respect for people and C.I.
10. How has the value been communicated?
 - Meeting with library managers,
 - and then decide who needs to be involved
 - Train the staff improvement team on Lean

- Feedback between the staff who were involved in the project and who weren't, the feedback was more on telling the story of how the problem been managed

B. Service improvement focus categorisation

11. Do you categorise your service
 - A. Customers
 - B. Stakeholders
 - C. Strategy or
 - D. Process base
12. Why is that? Customer is the user and process deliver the service
13. What is the service you provide specifically in this improved process? Providing access for student to the new books
14. What is the level of its complexity? the service is Simple.
 - a. Very Complex
 - b. Simple with few complex step
 - c. Simple
15. How often does it repeat? Every now and then when the new books get bought
16. Who specifically does your service support;
 - A. Customer (specify) Student
 - B. Government
 - C. Supplier (specify)
 - D. Wider range of university
 - E. Staff
 - F. Other (specify)
17. Who are your main stakeholders/ Customers for your service? Academic and Student
18. How do you understand your stakeholders' requirements? What we didn't do was to get student/staff involved, but in the coming new projects we get them involve.
19. Does stakeholders' requirements aligned with each other? Yes, They just wants things to work, but student are paying so they want it quicker
20. What is the impact of it on your day to day and improvement decision making? Always students wins
21. How do you communicate with your stakeholder? Face-to-face, Email, Phone
22. Do you get all your stakeholder involved in improvement? If so in what level of detail and when? We didn't in this project but we will involve them in our next projects, and this should be in same level of detail as library staff member as no idea is a bad idea, and we believe in respect people in our university.
23. How effective was the improvement towards the stakeholder satisfaction?

1. Very effective
2. Effective
3. Neutral
4. Un-effective
5. Very ineffective
6. Don't know

24. If you selected 3, 4 or 5 why? (otherwise move to Q.25)

25. How have you assessed the effectiveness of improvement? (Is there any measure in place to confirm that?) We didn't talk to customer but based on my gut feeling removing £80'000 inventory is a good improvement towards effectiveness.

26. Have the improvement enabled the area of your service to meet customer requirement better? Yes, by significant reduction in processing Time and instance access to the books.

C. Implementation

27. What activities are being undertaken as part of the implementation? It was more behind the scene and invisible. It was a good service which was already expected.

28. What proportions of stakeholder from the service area are currently involved?

- a) Fewer than 10%
- b) 10-50%
- c) 50-75%
- d) More than 75%

29. Does the process exceed the area of the service to any other part of the university? No, but the lesson learn can be

30. What types of stakeholder are involved in the improvement? Front line staffs, and supervisory staff were mostly involved but the senior level staffs were pup in just time to time to see the result of improvement at the time.

31. What strategy being used to involve/engage stakeholder in improvement? Getting to know them , tell them about our experience, telling stories, increase level of trust

32. What training and development is being provided to stakeholder? If the Lean was a new subject to them start with; Introduction to Lean, Lean training to Manager, Lean training to Admin, Problem solving, Lean thinking, Lean tools, Managing change

33. Any specific tools and techniques been used? Are they new to you?

- BOSCARD (Background, Objectives, Scope, Constraints, Assumptions, Risks, Deliverables),
- Process mapping
- Nominal Grouping Technique
- Analytical tools like SIPOC

- Mind mapping and Rich pictures
- Matrix prioritisation
- Visual management
- Quad of aims

34. Was the improvement based on internal or external consultant? **Internal**

35. Are you developing your own in-house improvement facilitators? **The Lean Team involves potentially... everyone! The aim of Lean is to involve all members of staff across the University.**

36. What drives your CI? **Economic situation, Competition from other universities, the Aims of the university set for itself, which all are aligned with whole lean idea.**

Appendix 6.6 Evaluation of the improvement Case 6
Coventry University Purchase Requisition

A. Improvement

1. Which area been improved? Finance group, BDSO
2. How has it been improved? Purchase requisition, used to take 3 weeks to process the order and feedback, now it takes 2days.
3. What method been used? And the key reason on why the method of improvement been selected? SIPOC and process mapping covered the process , and Stake holder covered the people.

SIPOC= to specify end to end process and everybody involved

Process mapping= To map the current state and highlight the bottle neck

Stakeholder analysis= To understand who had the power to make the decision to change it and what input everybody did have.

4. Why did it require improvement? When they initially done the process map the process was taking them too long 3weeks, because of the bottleneck. To do AR project you have to get costing from EFAP. They realised they have short, medium and long project however regardless of the type of the project the steps for doing the project for all were the same.
5. For how long the improvement has been in place? 1 Year
6. What are the long term aims on improvement? Have you achieved it? Yes.
 - D. Bring the team together from different department, as they brought together from decentralised to centralised system, but they didn't know how to work together.
 - E. Focus on the process so everyone work on the same process, as start and end was the same previously but the process in between was different depending on the department. The aim was to make standardisation.
 - F. Do the process more efficient, as they got less people with same amount of work to be done.
7. Is there any standard process in place for all improvements take place? No, but the process are standardised (staff done it not the managers) CUBIT process.
8. What was the value in improvement? There isn't a tangible value, the aim was to be more efficient by;
 - A. Better supplier relation
 - B. Customer satisfaction (staff)
 - C. Standard process regardless of department
9. How was the value been decided? They have been decided after finishing the project, there isn't any tangible benefit so the benefit/value would be intangible.

10. How has the value been communicated? Presentation to BDSO team, senior manager, and key stakeholder at the end of the project.

B. Service improvement focus categorisation

11. Do you categorise your service
- A. Customers
 - B. Stakeholder
 - C. Strategy or
 - D. Process base
12. Why is that? A) so we carried out the SIPOC and stakeholder analysis, C) ended up with standard process
13. What is the service you provide specifically in this improved process? PI (Principle investigator) raising the order and paying the invoice.
14. What is the level of its complexity? It was A (so many people involved) now it is C
- a. Very Complex
 - b. Simple with few complex step
 - c. Simple
15. How often does it repeat? Every day.
16. Who specifically does your service support;
- A. Customer (specify)
 - B. Government
 - C. Supplier (specify)
 - D. Wider range of university
 - E. Staff
 - F. Other (specify)
17. Who are your main stakeholders/ Customers for your service? PI (member of lecture staff), Finance department, estates (take in the packages and documents to the right people), BDSO team, External suppliers, External end user customer.

Main stakeholders are; Finance department, and BDSO team

18. How do you understand your stakeholders' requirements? BDSO is a customer of finance when they are looking for information on has it been paid, and Finance is customer of BDSO on has it been sending them the invoices.
19. Does stakeholders' requirements aligned with each other? They didn't before but now they have single process. They (BDSO and Finance) decided what would be the best system to suite the department for the whole process. They had face-to-face meeting and then a standard process and development of a one system which was made by BDSO was introduced to Finance.

20. What is the impact of it on your day to day and improvement decision making? BDSO now have more of the power and influence to the process itself. They can now on one screen see all needed information (they developed an excel sheet which hold all the information in one place).
21. How do you communicate with your stakeholders? Single system
22. Do you get all your stakeholders involved in improvement? If so in what level of detail and when? Yes, the key stakeholders, after we mapped the current/ future state map, had a meeting with senior manager of Finance before implementation on what and why we want to change, and they accepted it.
23. How effective was the improvement towards the stakeholder satisfaction?
1. Very effective
 2. Effective
 3. Neutral
 4. Un-effective
 5. Very ineffective
 6. Don't know
24. If you selected 3, 4 or 5 why? (otherwise move to Q.25)
25. How have you assessed the effectiveness of improvement? (Is there any measure in place to confirm that?) As now the chasing from PI is stopped.
26. Have the improvement enabled the area of your service to meet customer requirement better? yes

C. Implementation

27. What activities are being undertaken as part of the implementation?
- A. New SOP
 - B. Carried out training
 - C. Implemented the new invoice system
28. What proportions of stakeholder from the service area are currently involved?
- a) Fewer than 10%
 - b) 10-50%
 - c) 50-75%
 - d) More than 75%
29. Does the process exceed the area of the service to any other part of the university? Yes, finance and lecturing staff
30. What types of stakeholder are involved in the improvement? Service staff, Senior managers (Heads of departments), Team leaders, Operators within BDSO.
31. What strategy being used to involve/engage stakeholder in improvement?

- A. Contacted everyone involved in BDSO including even receptionist,
 - B. Allocated them time from day-to-day job to work on the project
 - C. external support for data collection and processing mentoring from internal consultant
32. What training and development is being provided to stakeholder? 4.5 days training sessions including;
- A. Current process mapping
 - B. 5Whys
 - C. Visual control
 - D. Work place organisation 5s
 - E. Identifying bottleneck
 - F. SIPOC
33. Any specific tools and techniques been used? Are they new to you? YES
34. Was the improvement based on internal or external consultant? Internal
35. Are you developing your own in-house improvement facilitators? Yes, they all became internal facilitator, as the knowledge been passed to them by training.
36. What drives your CI?
- A. Transferred Knowledge
 - B. Support from senior manager
 - C. Ownership of people in department

Appendix 6.7 Evaluation of the improvement Case 7

Portsmouth University, Erasmus Project

A. Improvement

1. Which area been improved? Finance, Erasmus budget holder
2. How has it been improved? Duplication in expenses removed, Stream-lined the process so that the authorisation of the expense goes directly to the Erasmus coordinator.
3. What method been used? And the key reason on why the method of improvement been selected? It was more an informal chat on what we trying to do, who is responsible what is the main problem and done process map
4. Why did it require improvement? Finance got a lot of questions from Erasmus team that caused lots of delay, there was issues like when the Erasmus date was exceeded the academic had to pay themselves. Extra work and checking was involved, people had no ownership.
5. For how long the improvement has been in place? 2 month
6. What are the long term aims on improvement? Have you achieved it? Yes, don't have to work extra any admin work for academic need to be in place.
7. Is there any standard process in place for all improvements take place? No because it's not our day to day job, I have been very keen to formalise but it is very localised we have a way but it gets change. Process improvement is an ongoing exercise with elements of C.I to work as a team effectively.
8. What was the value in improvement? Time mainly, as we can do other process by created capacity by training them for the new job.
9. How was the value been decided? It happens to be, we wanted to remove the waste it happens to be time.
10. How has the value been communicated? Booked IT a pc room and invited people who were involved (2hrs) to show them how the new system works

B. Service improvement focus categorisation

11. Do you categorise your service It depends,
 - A. Customers
 - B. Stakeholder
 - C. Strategy or
 - D. Process base
12. Why is that? Process are tools to deliver, however the strategy is there to safe guard the assets and providing good information. Customer; whatever we deliver we need to do it currently for a customer and stakeholder. We need to keep everybody happy by keeping the interest of university in mind.

13. What is the service you provide specifically in this improved process? The service provides information, process the expense claims
14. What is the level of its complexity?
- Very Complex
 - Simple with few complex step
 - Simple
15. How often does it repeat? 2-3 times a year
16. Who specifically does your service support;
- Customer (specify) ; Academic & funding body
 - Government
 - Supplier (specify)
 - Wider range of university
 - Staff
 - Other (specify)
17. Who are your main stakeholders/ Customers for your service? Broad range of stakeholders;
- Budget holder
 - Director of finance
 - Academic
18. How do you understand your stakeholders' requirements? Took yourself to customer position and use our own way of judgment. In case of Erasmus we (finance) sat down with Erasmus coordinator and narrowed down the process.
19. Does stakeholders' requirements aligned with each other? It depends, for instance sometimes they want something else, there is emphasis on externally generated revenue, therefore all the departments try to put as much as they can in the report. But we need to make sure that it's transparent enough for budget holder. Meanwhile we need to understand why they need different things.
20. What is the impact of it on your day to day and improvement decision making? Internal drive, I wonder do we providing service that we won't need to anymore, we need to ask the question more often.
21. How do you communicate with your stakeholders? Face to face, telephone, email, and usually try to sit down when things are complex
22. Do you get all your stakeholders involved in improvement? If so in what level of detail and when? Yes, normally when we change a service we get the stakeholders involved to introduce the new service and how it works, but if the change is behind the scene and the end service for customer still remain the same i.e. if only the sequence of activities get change not the main service there is no need to involve them.

23. How effective was the improvement towards the stakeholder satisfaction?

1. Very effective
2. Effective
3. Neutral
4. Un-effective
5. Very ineffective
6. Don't know

24. If you selected 3, 4 or 5 why? (otherwise move to Q.22)

25. How have you assessed the effectiveness of improvement? (Is there any measure in place to confirm that?) We don't measure stakeholder satisfaction internally, but if there is any problem or issue it was raised in our monthly meeting. In form of the feedback from budget holder, Finance team, and Erasmus team (as we did ask in the meeting informally how did you find the new system?)

26. Have the improvement enabled the area of your service to meet customer requirement better? Yes, budgetary control improved.

C. Implementation

27. What activities are being undertaken as part of the implementation?

- Documented all the process
- Communicated with everybody why it changed, and what is the improved new system, and where to find it

28. What proportions of stakeholder from the service area are currently involved?

- a) Fewer than 10%
- b) 10-50%
- c) 50-75%
- d) More than 75%

29. Does the process exceed the area of the service to any other part of the university? No it is very limited to the people adopted the improvement

30. What types of stakeholders are involved in the improvement? Administer majority

31. What strategy being used to involve/engage stakeholders in improvement? It was very much operational rather than strategy base

32. What training and development is being provided to stakeholder? Explain the new process in an email to all potential participants in the exchange programme, and one to one explanation to our faculty exchange coordinator.

33. Any specific tools and techniques been used? Are they new to you? Tools used are mainly process mapping, swim lanes. As I facilitated the rapid improvement events (although

Erasmus was more informal) the tool wasn't new to me, I had learned it in other learning events myself

34. Was the improvement based on internal or external consultant? Internal, although I learned a lot about the fund and the process as we went along.
35. Are you developing your own in-house improvement facilitators? No, it's very much a case of personal interest in improving things, it is not embedded in the organisation at all, although we have built a reputation based on our successes and attitude
36. What drives your CI? CI is very much a personal, opportunist affair, although there may be reference to CI in the university's or faculty's strategy etc there is no structure or other evidence to actively facilitate, support or drive CI

Appendix 6.8 Evaluation of the improvement Case 8

Portsmouth University, Referral Project

A. Improvement

1. Which area been improved? Graduate centre Student Referral Process
2. How has it been improved? Rapid improvement workshop to streamline the process
3. What method been used? And the key reason on why the method of improvement been selected? Swim lanes, Process mapping to map the process
4. Why did it require improvement? It took resources and time and manual work was involved plus at the end of the process if they realised something was wrong (which experience showed every year something was wrong) or something needed to be changed it took them twice longer. That made us to think how can we do it better?
5. For how long the improvement has been in place? 1.5 year
6. What are the long term aims on improvement? Have you achieved it? Free up resources and deliver better quality and better service to student
7. Is there any standard process in place for all improvements take place? No, because improvement is not our day to day job, however I have been very keen to formalise the process.
8. What was the value in improvement? Time, accuracy, process be more reliable and we work more effectively to create capacity to add value in other areas
9. How was the value been decided? It just happened to be we wanted to remove waste and the value happens to be time.
10. How has the value been communicated? We sent an email out on the change happened and put the designed standard process on data base system in which only the team had access to, and if someone out of team had question regarding the process they would be referred to us.

B. Service improvement focus categorisation

11. Do you categorise your service
 - A. Customers
 - B. Stakeholder
 - C. Strategy or
 - D. Process baseDepends,
12. Why is that? Process are tools to deliver, Strategy is used to keep everyone happy by keeping the interest of university in mind, Customer whatever service we deliver we need to do it correctly for customer.

13. What is the service you provide specifically in this improved process? It is a service to the student and academic and it is mainly on right timing, on planning students, invigilator, and rooms.
14. What is the level of its complexity? It was "A" but now it is "B", by customizing the options you offering to have basic process and for the exception deal individually.
 - a. Very Complex
 - b. Simple with few complex step
 - c. Simple
15. How often does it repeat? Once a year
16. Who specifically does your service support? service university provide to students, and we facilitate to exam the student for academic
 - A. Customer (specify)
 - B. Government
 - C. Supplier (specify)
 - D. Wider range of university
 - E. Staff
 - F. Other (specify)
17. Who are your main stakeholders/ Customers for your service? Academic and students
18. How do you understand your stakeholders' requirements? Academic were involved in workshop
19. Does stakeholders' requirements aligned with each other? The service university is offering to student on referral is traditionally done by written exam, and we need to make sure that the student do it as good as possible as this is the responsibility of the institution to keep the exam within the expected standard.
20. What is the impact of it on your day to day and improvement decision making? Internal drive, as I usually wonder are we providing service that we don't need to anymore. That's what we need to ask the question.
21. How do you communicate with your stakeholder? Face to face, telephone, email, usually sit down when things are complex.
22. Do you get your stakeholders involved in improvement? If so in what level of detail and when? Yes, normally when we change a service we get the customer involve introducing the new service and how it works. But if the sequence of the service get change not the main service there is no need to involve the wider range of stakeholder as it is what goes behind the scene.
23. How effective was the improvement towards the stakeholder satisfaction?
 1. Very effective
 2. Effective
 3. Neutral

- 4. Un-effective
 - 5. Very ineffective
 - 6. Don't know
24. If you selected 3, 4 or 5 why? (otherwise move to Q.22) We don't measure customer satisfaction, and if they face a problem they contact us.
25. How have you assessed the effectiveness of improvement? (Is there any measure in place to confirm that?) the service is the same and the internal process is improved
26. Have the improvement enabled the area of your service to meet customer requirement better? Yes.

C. Implementation

27. What activities are being undertaken as part of the implementation?
- Documented what happens each stage
 - Workshop on Swimlanes, Process mapping
 - Academic did the process map; The aim to do the process map in workshop was to guide the process mapping and streamline the process
28. What proportions of staff from the service area are currently involved in the implementation?
- a) Fewer than 10%
 - b) 10-50%
 - c) 50-75%
 - d) More than 75%
29. Does the process exceed the area of the service to any other part of the university? No it was very limited to the people adopted the improvement in graduate centre
30. What types of stakeholder are involved in the improvement? Administrator majority
31. What strategy being used to involve/engage stakeholder in improvement? It was operational very much rather than strategy base.
32. What training and development is being provided to stakeholder? None as far as I am aware, the new process is documented and distributed among all participants.
33. Any specific tools and techniques been used? Are they new to you? Tools used are mainly process mapping, swim lanes
34. Was the improvement based on internal or external consultant? I was external to the process, so that was an external consultant (although I am part of the same organisation). Advantage of an external consultant is a fresh pair of eyes.
35. Are you developing your own in-house improvement facilitators? No, it's very much a case of personal interest in improving things, it is not embedded in the organisation at all, although we have built a reputation based on our successes and attitude

36. What drives your CI? CI is very much a personal, opportunist affair, although there may be reference to CI in the university's or faculty's strategy etc there is no structure or other evidence to actively facilitate, support or drive CI

Appendix 6.9 Evaluation of the improvement Case 9

Cardiff University HR, recruitment Project

A. Improvement

1. Which area been improved? HR department
2. How has it been improved? It was a Strategy alignment project to define process and activities of the recruitment with tangible benefit of speeding the recruitment of staff.
3. What method been used? And the key reason on why the method of improvement been selected? Strategy deployment approach, value stream mapping

The main problem was the academic weren't providing the required information to specify the recruitment well. The improvement was done by a software template to specify the mandatory field to be filled by the academic, to improve the communication between HR and academic to specify the expectation.

4. Why did it require improvement? The main problem was the academic wasn't very interested to put time for communicating on what exactly they are looking for, therefore the HR wasn't getting the right required information. The process of recruiting was taking 4-6 months. Therefore the academic venture needed improvement.
5. For how long the improvement has been in place? 5years.
6. What are the long term aims on improvement? Have you achieved it? Aim was to recruit staff within 2-3 months by reducing the inefficiency, and removing waste.
7. Is there any standard process in place for all improvements take place? Yes, the future state was defined as well as the 6-7 projects within the main project such as Training, KPI to run the HR process which all been set in place.
8. What was the value in the improvement? The project was more based on Muri rather than Muda and waste.
9. How has it been decided? Following down the university issues to be solved this problem showed it needs to be solved quicker because of the frustration for both academic and HR. As the HR wasn't getting the right information despite of time and effort the academic after 4-6 months still wasn't getting what they wanted, therefore the frustration were from both parties.
10. How has it been communicated? Ran a session with senior managers in HR

B. Service improvement focus categorisation

11. Do you categorise your service
 - A. Customers
 - B. Stakeholder
 - C. Strategy or
 - D. Process base
12. Why is that? Origin of the improvement was to provide customer better service.

13. What is the service you provide specifically in this improved process? Paper based service which then got transferred to a file in the system. In the improvement the service moved to computer base system.
14. What is the level of its complexity?
- Very Complex
 - Simple with few complex step
 - Simple
15. How often does it repeat? Once per application
16. Who specifically does your service support;
- Customer (specify)
 - Government
 - Supplier (specify)
 - Wider range of university
 - Staff (in general anyone who is hiring within the university)
 - Other (specify)
17. Who are your main stakeholders/ Customers for your service? Staff
18. How do you understand your stakeholder requirements? Had report of many complaints from customers.
19. Does stakeholders' requirements aligned with each other? Yes it was aligned and it generalized spread perception.
20. What is the impact of it on your day to day and improvement decision making? It was aligned therefore we got on and did the day to day improvement
21. How do you communicate with your stakeholder? When the program rolled out the stakeholders got informed about the changes and improvement made.
22. Do you get all your stakeholders involved in improvement? If so in what level of detail and when? Yes, we used the couple of departments (academic) by mapping on early stage of diagnostic and in details for the process.
23. How effective was the improvement towards the stakeholder satisfaction?
- Very effective
 - Effective
 - Neutral
 - Un-effective
 - Very ineffective
 - Don't know
24. If you selected 3, 4 or 5 why? (otherwise move to Q.25)

25. How have you assessed the effectiveness of improvement? (Is there any measure in place to confirm that?) The measure was the beforehand average time taken and after improvement the time taken 4-6 months to 2-3 months
26. Have the improvement enabled the area of your service to meet customer requirement better? Yes.

C. Implementation

27. What activities are being undertaken as part of the implementation? The main focus was to getting the right information to the system while we improving the system. We facilitated the work ourselves and we were part of internal consultant. There was awareness of what we were doing. After the workshop with the HR senior manager the most important problem were decided to act on, there wasn't much of training but there was awareness of why and what we are doing.
28. What proportions of stakeholder from the service area are currently involved?
- a) Fewer than 10% however the change effected everyone in university
 - b) 10-50%
 - c) 50-75%
 - d) More than 75%
29. Does the process exceed the area of the service to any other part of the university? Yes the customer was from whole university.
30. What types of stakeholders are involved in the improvement? Mostly from HR (quite senior, middle), academic
31. What strategy being used to involve/engage stakeholder in improvement? Followed from senior managers workshop to decide the area to improve in the project then moved forward to teamwork.
32. What training and development is being provided to stakeholder? For the people in HR no training and we facilitated the mapping but in other part of the university as we saw our role to help in how to do the improvement and didn't want to be involved for all improvement projects, we trained an internal team in order to pass out knowledge making them able to work on further improvement in different area of the university.
33. Any specific tools and techniques been used? Are they new to you? Strategy deployment (Hoshin Kanari), Big picture map (value- stream mapping) the project wasn't too tool based it was more strategy and workshop base.
34. Was the improvement based on internal or external consultant? Internal
35. Are you developing your own in-house improvement facilitators? Yes we did
36. What drives your CI? The focus of the CI is the team of 4 people who their main role in the university is to work on improvement projects.

Appendix 6.10 Evaluation of the improvement Case 10

Leicester University Maintenance Project

A. Improvement

1. Which area been improved? Maintenance, Leicester University
2. How has it been improved? By system thinking, with team containing external consultant from Vanguard and internal staff development, as well as maintenance team and stakeholders from hall of residence.
3. What method been used? And the key reason on why the method of improvement been selected? System thinking, Vanguard model, "Check" section used;

Check; as part of methodology was used to understand the customer point of view with aim of maintaining the buildings and service. The average meantime was 15day and the control was 45 days. The average meantime reduced to 2.3days and the control time to 28days after improvement.

We started with checking the point of contacts of service with customer. Then we looked at demand to do so we referred to available data we had and used SPC, by analysing data we realised the average meantime is 15days and as we looked along that were getting worse.

We analysed the 25000 of complaints from customers to find out how often and on what the complaints were made.

Based on Vanguard methodology approach we divided the demand to two separate sections;

- Value demand: for example the customer call on saying my toilet is blocked
- Failure demand; the customer call to say "I have told you my toilet is blocked but i haven't got service from you yet to fix it".

Categorizing the demand we moved to capability chart, to find out what value is and what the waste is and what the impact of the waste on our customer is. Then we started to think why the system is doing that, at that time we used SAP system to prioritise the demands but we moved to Excel sheet which we can record the demands in based on FIFO. We made Value step;

- A. Access to the fault
- B. Able to diagnose it first time
- C. Fix it

We needed to know what information we need to be able to work with the value steps. We worked out what skills we need, then we came with new principles which the most driving one was "faculties get serve based on FIFO on our recorded report". We used board in the office as well to show the FIFO flow, while we were using the Excel at the same time.

We started it in 3buildings initially and listed all the faults, instead of waiting for calls from customer that was done to make a fault free platform to start with the Maintenance project. We needed to work closely with the store as well in order to get the parts in on-time because we now knew the problem well enough.

4. Why did it require improvement? It needed improvement because the whole system needed improvement and was broken as the managers realised. The weeks and weeks took to fix the light bulb for instance. The respond time wasn't reasonable at all, 45 days. The system had

joint of problems from how people report, to how well the reported issues get solves, and the responds time.

5. For how long the improvement has been in place? It is C.I, and with Vanguard methodology the project is going through 3 different steps, which the first step is just finished on 5th of Dec 2011;
 - Check; What happening and why is it happening
 - Plan; what perfect is and you put it in experiment
 - Do; Make it normal and roll the people in
6. What are the long term aims on improvement? Have you achieved it? Achieving the perfection which is a C.I and is in progress and we are looking in to the system. The main aim is “experiment being successful and make it normal”.
7. Is there any standard process in place for all improvements take place? Yes the Vanguard standard process system thinking.
8. What was the value in improvement? To make the work better, as the cleaner you get the system the bigger the saving will be.
9. How was the value been decided? It was more decided based on the method and available methods and knowledge to be used in improvement, in order to make the bigger value to the business.
10. How has the value been communicated? A lot of the communication done about what system thinking is about with operational managers

B. Service improvement focus categorisation

11. Do you categorise your service
 - A. Customers
 - B. Stakeholder
 - C. Strategy or
 - D. Process base
12. Why is that? System thinking is all about customer point of view
13. What is the service you provide specifically in this improved process? Maintenance building and service
14. What is the level of its complexity? It was A, now it is C (FIFO)
 - a. Very Complex
 - b. Simple with few complex step
 - c. Simple
15. How often does it repeat? All time and every day. Sometimes it can be even outside of standard working hours.

16. Who specifically does your service support;
- Customer (specify) Students
 - Government
 - Supplier (specify)
 - Wider range of university
 - Staff
 - Other (specify)
17. Who are your main stakeholders/ Customers for your service? Staff and students
18. How do you understand your stakeholders' requirements? The main stakeholder i.e. customer expectation;
- By doing "Check" and dividing the "Value demand" from "failure demand" as well as
 - asking the other departments who are involved in the process within the system about the customer interaction point
19. Does stakeholders' requirements aligned with each other? yes, what matters to customers as main stakeholders is the issue be solved as quickly as possible.
20. What is the impact of it on your day to day and improvement decision making? Now people own the process, and the team empowerment increased in the service, as well as the managers understand they need to know the system and how it works rather than leaving it to the staffs. In result the impact to the day to day job made us to fulfil the customer requirement.
21. How do you communicate with your stakeholders? Helpdesk (trained people) and the whole team
22. Do you get all your stakeholders involved in improvement? If so in what level of detail and when? Yes, 4 people work in residential who were the main stakeholder of the service were involved from the beginning of the training and the project, and we went to customer as well.
23. How effective was the improvement towards the stakeholder satisfaction?
- Very effective
 - Effective
 - Neutral
 - Un-effective
 - Very ineffective
 - Don't know
24. If you selected 3, 4 or 5 why? (otherwise move to Q.25)
25. How have you assessed the effectiveness of improvement? (Is there any measure in place to confirm that?) Based on one of the building the feedback from customer, it was very effective for the start, and we have measures in place as one of them is End-to-end fix time to gather data on:

- How often you can get access
 - % first time fix
 - Spare part arrival on time, using pull system and Kanban
26. Have the improvement enabled the area of your service to meet customer requirement better? yes

C. Implementation

27. What activities are being undertaken as part of the implementation? The Vanguard model on “check” steps;
- A. Purpose of the system, what matters to the customer
 - B. Demand; the frequency of the demand
 - C. Capability; from existing measure to find out how well we are fulfilling the demand
 - D. Flow; what actually happening and how the demand is getting passed within the system, how many work passed to the customer, what was waste on it
 - E. System condition
 - F. Management of thinking change; to understand why we are doing the change, which is called double loop in system thinking.
28. What proportions of stakeholder from the service area are currently involved? the improvement team itself were fewer than 10%, however now that the project is rolled out it improved to range of 10-50 %
- a) Fewer than 10%
 - b) 10-50%
 - c) 50-75%
 - d) More than 75%
29. Does the process exceed the area of the service to any other part of the university? Yes, it covers the whole university’s buildings
30. What types of stakeholders are involved in the improvement? Mostly Up-face staffs because in “check” steep of the project the people who actually do the work need to be involved such as Electrician, and development staff as well as the deputy director of residency
31. What strategy being used to involve/engage stakeholders in improvement?
- Pull system used in a way of senior manager thought the system is broken and the requirement for fixing the system is felt. Then by senior manager people with required skill is chosen, the one liked to be in the improvement project.
32. What training and development is being provided to stakeholders? The improvement team learn as they do the project however there is training in place for senior managers and operational managers on “system thinking” called “management development program”.
33. Any specific tools and techniques been used? Are they new to you? Because the project is more data driven and it is about what customer wants, the tool used were “capability chart” which training done on it, but the rest was mainly focus on being able to think differently. And the most important thing to remember is “system thinking” is a method not a tool.

34. Was the improvement based on internal or external consultant? Mix of 3 external consultants as intervention, and the internal improvement team

35. Are you developing your own in-house improvement facilitators? Yes, it is more on managing and passing the knowledge rather than developing in-house consultant

36. What drives your CI?

CI is part of the system thinking based on Deming model however at the moment it seems to be more a personal thing for each staff. There is an expectation with cooperation on academic service to draw the academic in gradually.

Appendix 7 *United Kingdom Universities type classification*

- Ancient Universities; refers to medieval and renaissance universities that have continued to exist, i.e. they were founded before the 1800s
- Red Brick Universities; the civic universities which granted a charter between 1900 and 1963
- New Universities; the universities which previously been classified as Polytechnics but have now been granted University status.

University	Type of University	Student population (2014)	Guardian League table (2014)
Cardiff	Red Brick University	26,296	29
St Andrews	Ancient University	7,258	4
Portsmouth	New University	20,230	48
Leicester	Red Brick University	Over 20,000	13
Coventry	New University	Over 31,045	33

The list of interviewed Universities and their classifications

Appendix 8 *Lanchester Library*

Lanchester Library offers a range of modern study environments. It accommodates over 300 PCs and a wireless network, which is available to all University members. Attracting over 700,000 visitors a year we provide a focal point for student learning and information access. The award winning building is of interest to many visitors due to its highly energy efficient design. Occupying approximately 10,000 square metres it is completely naturally ventilated and employs natural light with innovative lighting technology to significantly reduce energy consumption compared to traditional air conditioned buildings (Coventry University Library, 2012).

The Library is divided into 3 subject floors:

- Science, Engineering and Health – Floor 1
- Social Sciences, Business and Law – Floor 2
- Arts, Design and Media – Floor 3

The Library exists to support the teaching, learning and applied research of the University by connecting staff and students to the information they need (Lanchester Library customer service, 2009). The service they provide covers the training, workshops, IT access as well as the information supplied within book (online/hard copy), DVD's, Journals (online/hard copy), Printing and graphic service, as well as the possibility to supply items from their stock to members of the following schemes:

- The British Library national network for interlending and document supply (library code = CV/C-1)
- IFLA Voucher Scheme for international requests.

In case of the service standard in place the library support teaching, learning and research of the university by;

Our commitment to our customers	Our Targets
<p><i>Connecting staff and students to the information they need;</i></p> <ul style="list-style-type: none"> ▪ We acquire sufficient relevant material in a range of formats ▪ We maximise the proportion of the loanable physical stock ▪ We maximise access to information where and when needed by prioritising material in digital format ▪ We strive to make complex information environments simple and intuitive at point of use ▪ We obtain additional material through inter-lending ▪ We aim to achieve 80% satisfaction in the SES survey regarding: ▪ Availability of books and other print resources ▪ Availability of the online resources & Accessing online library resources from off-campus computers 	<ul style="list-style-type: none"> ▪ Make all urgent orders available for loan within one week of order ▪ Make all other reading list materials available within four weeks of order ▪ Supply all Document Supply requests within one week ▪ Stream all requested audio, DVD and VHS materials within two weeks ▪ Shelve 75% of returned items within 24 hours ▪ Provide access to the Library catalogue and eLibrary for at least 95% of the time ▪ Administer standard systems maintenance in the agreed 'at risk' period (Tues 08.30-12.00) or outside core hours ▪ Monitor and improve the ease of use of our online environments through regular usability testing
<p><i>Maximising the use of our resources effectively for the benefit of our users.</i></p>	<p>We benchmark expenditure on information against other post-92 universities</p>
<p><i>Ensuring a welcoming and safe environment conducive to study and research.</i></p>	<p>We aim to achieve 80% satisfaction in the SES survey regarding:</p> <ul style="list-style-type: none"> ▪ Availability of group study space & Availability of individual study space ▪ Effectiveness of noise zoning ▪ Working environment (temperature, furniture etc.)
<p><i>Providing IT facilities to facilitate study and research</i></p>	<ul style="list-style-type: none"> ▪ Provide computers at 30% of the study spaces ▪ Have at least 95% of computers in good working order ▪ Investigate faults with photocopiers within 24 hours
<p><i>We strive to continually improve the services we provide and ensure they are responsive to customers' needs.</i></p>	<ul style="list-style-type: none"> ▪ Achieve 75% satisfaction with 'responsiveness of the Library' in the SES survey ▪ Respond to Tell-us comments and suggestions within 5 days ▪ Investigate complaints and respond within 5 days ▪ Summarise and report back annually to customers on the actions taken in response to their complaints and suggestions

Lanchester Library Service Standards 2009-10 (Lanchester Library customer service, 2009)

Appendix 8.1 *Implementation plan*

The implementation plan was;

ID	Action	Owner	Date
1	Eliminate book sorter receipts and change screen		20/09/2011
2	Complete rolling training programme for staff in new process - maximum trolley team size of 2 - 60 item limit in bins		26/09/2011
3	Review bin capacity and shelf mark parameters on book sorter and implement as necessary		14/09/2011
4	Investigate options and make recommendation to library management team for alternative book ends		31/12/2011
5	Investigate if display screens can include clock and review need for clocks		19/08/2011
6	Investigate movement of red light so that it is visible outside sorting room		14/09/2011
7	Create recommended staff rota for new process with KT, CM, HH and agree with management team, including Information Assistants collecting pickups and slot ins		25/08/2011
8	Review number of trolleys required (approx. 20) and remove excess		30/09/2011
9	Remove internal book drop bin and adjust opening times of external book drop bin		19/08/2011
10	Check staff lift functioning OK		26/08/2011
11	Set up weekly run chart and histogram templates in book sorter room		03/10/2011
12	Include new process requirements in student induction		26/08/2011
13	Make recommendation for Bibs to shelve new acquisitions and journals		01/09/2011
14	Review need of stamp with Media Services Manager		01/09/2011
15	Clear down all WIP in library		04/10/2011
16	Follow-up review meeting		16/11/2011

Implementation plan on Library Shelving project (Coventry University, 2011)

Appendix 9 *SAB/PAB System*

The Subject Assessment Board (SAB) is responsible for approving the marks of particular modules; it does not make decisions on individual students results or progression, nor does it take into account any extenuating circumstances, though it can decide to scale all marks (up or down) if there were external factors affecting all students taking that particular examination/assessment (e.g. Fire alarm) (Coventry University examiner handbook, 2011). Once the marks have been approved by the SAB, the module marks are 'locked', and passed to the various Programme Assessment Boards responsible for the courses on which the students have taken the module.

The Programme Assessment Board (PAB) is responsible for determining the progress or otherwise of students at intermediate stages of courses and decisions on awards at the final stage. The PAB considers the overall performance of each student, normally listed by course and stage (Coventry University examiner handbook, 2011). The PAB system is used to make sure the modules and the credits are correct, and if there is a missing credit student would be either Fail or APEL (Prior Learning Credits missing). The PAB system helps to decide on a course of action. And at the end the Academic Regulations require all results to be agreed by all External Examiners appointed to that SAB or PAB (Coventry University examiner handbook, 2011).

Appendix 10 *BDSO service*

The service is divided into two separate areas;

1. Pre Award;

- Education- learn about funders and how to apply
- Finding opportunities
- Building an application
- Costing and Pricing
- Authorisation and Submission
- Contract negotiation

2. Post Award;

- Financial management and reporting, provision of regular expenditure statements
- Management of audits
- Outputs and result monitoring to achieve contract compliance
- Project Steering committee servicing
- Contract variations
- Project procurement
- Supporting IPR (Intellectual Property rights) and Licensing management

At BDSO is in place as the university understand that externally funded projects require a good application, well managed project delivery, administration and reporting structures.

New submissions	Responding to Funder Obligations
<ul style="list-style-type: none">• Opportunities notification-get direct notification from BIDS in your research area• Funder specialists- receive help on what funders really want• Accurate costing-ensuring that all costs are included• University Authorisation-getting the bureaucracy done for you• Submission-ensuring the bid is submitted on time• Contract negotiation- Protecting the University position	<ul style="list-style-type: none">• Liaison with the funder and acting as first point of contact• Claim management• Collection and production of progress reports• Facilitation of both internal and external audits• Contract variations and negotiations with the Funder

Project Start up <ul style="list-style-type: none"> • Contract review and dissemination • Set up of collaboration agreements with project partners • Arranging and submission of Start Certificates • Recruitment support • Set up of project monitoring systems • Organisation of project start up meeting 	Project Monitoring and Management <ul style="list-style-type: none"> • Project Management • Monitoring project milestones • Risk management • Setting up a Steering Committee • Servicing of “Project” Steering Committees • Creation of project and delivery plans
Project Finance <ul style="list-style-type: none"> • Set up of project codes • Budget monitoring, projection and forecasting • Liaison with external funders • Provision of timesheets and staff cost analysis systems • Processing ARDA/staff payments 	Project Deliverables <ul style="list-style-type: none"> • Evidence collection of project deliverables • Support with marketing activities • Record keeping • Dealing with client/funder requests • Data Analysis
Project closure <ul style="list-style-type: none"> • Provision of advice on achieving and retention of project documents • Support in obtaining continuations funding 	

BDSO provided service (Coventry University staff portal, 2012)

Appendix 11 *St Andrews Lean improvement team, Estate project*

The lean improvement approach is based on “Respect of people” and “CI” which is known as two main principles of Lean in St Andrews. Lean in the university had three main goals;

1. Culture change-To create a drive and appetite for continuous improvement
2. Effectiveness- To ensure that all business processes meet existing and emerging needs
3. Efficiency- To maximise the use of all resources in the delivery of services (St Andrews, 2012).

The team believes *“the adoption of Lean principles has led to significant savings and improvements to service quality within the UK”* (St Andrews , 2012a)

The range of service provided by estate is;

1. New or replacement signs
2. Cleaning
3. Ground services
4. Window cleaning

Appendix 12 *St Andrews Lean improvement team, Library project*

The library offers three different services to staff and students;

1. Borrowing
2. IT access within the library
3. Bindery
4. Book recommendations
5. Group Study room bookings
6. Lockers
7. A selection of Online booksellers
8. Photographic reproduction; how to buy a copy of a photograph from the special collection department
9. Postgraduate desks
10. Photocopy cards³

³ <http://www.st-andrews.ac.uk/library/services> Accessed on 25th of July 2012

Appendix 13 *Portsmouth University, Erasmus project*

Erasmus ("European Community Action Scheme for the Mobility of University Students") is the European Commission's educational programme for Higher Education students, teachers and institutions. It was introduced in 1987 with the aim of increasing student mobility within the European Community, subsequently the European Economic Area countries, and now also the Associated Countries of Central and Eastern Europe, Cyprus and Malta.⁴

"Erasmus enables higher education students to study or work abroad as part of their degree and staff to teach or train in 33 European countries"⁵

⁴ <http://stream.port.ac.uk/business/erasmus/erasmus.htm> Accessed on 27th of July 2012

⁵ <http://www.britishcouncil.org/erasmus> Accessed on 27th of July 2012

Appendix 14 *Portsmouth University, Referral service project*

The primary purpose of the Board of Examiners is to oversee the assessment of awards, to decide, for each student, on progression on a programme and to make recommendations to Academic Council on the award, and category of award, to be conferred upon individual students.

“The Board of Examiners shall convene meetings to discharge the duties defined by regulations. The Board of Examiners shall meet once each academic year, normally at the end of the academic year. Academic Council will fix dates between which the meetings must be convened in each year and specify Boards of Examiners exempted from that requirement.”⁶

The Unit Assessment Board will convene meetings to discharge the duties defined by the regulations. The Unit Assessment Board, additionally, shall hold at least one sub-committee meeting to consider the outcomes of referral and /or deferral before the start of each academic year. The Assessment board make decision between following options for each students:

- A. Passed; confirms that the credit has been assigned.
- B. Referral; confirms that the student may be eligible for referral and that the requirements for referral have been determined
- C. Failed; confirms that the student is not eligible for referral and that credit has not been assigned.
- D. Decision Deferred; confirms that the student has not satisfactorily completed the assessment of the unit for good reason and that conditions and a time scale have been set for the student to undertake the assessment or further assessment of the unit.
- E. Decision Pending: confirms that the Unit Assessment Board has been unable to confirm the mark and assign credit because of some procedural delay⁷

⁶ Examination and Assessments Regulations, Version 4.2 November 2011
<http://www.port.ac.uk/accesstoinformation/policies/academicregistry/filetodownload,10383,en.pdf> Accessed 28th July 2012

⁷ Examination and Assessments Regulations, Version 4.2 November 2011
<http://www.port.ac.uk/accesstoinformation/policies/academicregistry/filetodownload,10383,en.pdf> Accessed 28th July 2012

The purpose of referral is to allow a student who has failed a unit or units at the first attempt, or after repeat assessment, to have the opportunity to achieve the credit required to complete that stage and make normal progress, or satisfy the credit requirements for an award, without having to repeat the unit(s) in full.

“Academic Council shall prescribe a fixed period or periods within which students shall be required to undertake any permitted referral and/or latest dates by which students must have completed permitted referral. Academic Council may prescribe a different period or periods and/or different latest dates according to the mode of study.”⁸

After the decision made on students who need to retake the exam, the Graduate Centre is responsible to arrange the exam venue.

⁸ Examination and Assessments Regulations, Version 4.2 November 2011
<http://www.port.ac.uk/accesstoinformation/policies/academicregistry/filetodownload,10383,en.pdf> Accessed 28th July 2012

Appendix 15 *Cardiff University, HR service project*

The HR in Cardiff University provides different services such as;

- HR Advisory; for instance Discipline & Grievance cases, Performance management, Employee relations, and Sickness/Absence
- Shared Services; such as Certificates of Sponsorship, Contract and Amendments, Redeployment Register, and CRB
- HR Information Management; e.g. Building Survey, Data/Statistical analysis, and Professional Membership Renewals
- Training and Organisational Development; such as Appraisal, Equality and Diversity, Development for Academic and support staff, and Evaluation⁹

The University itself had started to apply Lean in different area for improvement by having the vision to “create momentum that secures and sustain external recognition as one of the 50 World Leading Universities by 2020¹⁰”. The message from the Vice-Chancellor indicates that;

"The Lean University project will play a vital role in the University's strategic development and shaping the way we work at Cardiff. This is an innovative project, demonstrating Cardiff's commitment to become a World-Leading university."

The way to approach different projects is mainly based to three different levels;

1. Strategy; these are projects where Lean University project, help areas develop a vision and purpose that could be worked towards and that everyone, in that part of the organisation, can get behind.
2. End-to-End; these are the projects that cut across the university involving a number of divisions and schools. Consequently, they tend to be quite complex - not necessarily in terms of the process itself - but in terms of the number of stakeholders.
3. Continuous Improvement; this is where activities are contained within a distinct area. This means there is far more control over making and embedding the improvements.¹¹

⁹ <http://www.cardiff.ac.uk/humrs/index.html> Accessed on 29th of July 2012

¹⁰ <http://www.cardiff.ac.uk/lean/index.html> Accessed on 29th of July 2012

¹¹ <http://www.cardiff.ac.uk/lean/strategy/lean-strategy.html> Accessed on 29th of July 2012

Appendix 16 *Leicester University, Maintenance project*

Helpdesk contains trained people who the customer can contact meanwhile the whole team is trained to be able to communicate with customer. The list made by Maintenance team for communicating what can be expected by customer from them;

- Undertake reactive maintenance/repairs and make every effort to meet target response times.
- Provide a Helpdesk service from 08.30 to 17:00 hours on working days (Monday-Friday excluding bank holidays).
- Provide emergency call-out 24/7 for 52 weeks of the year.
- Liaise with customers within the appropriate area prior to undertaking any work.
- Notify the customer of the expected response date if the assigned time-scale cannot be met.
- Inform the customer, that the repair has been resolved or assessed, indicating what action is planned if the latter.
- Monitor the quality of work and take corrective action when necessary.¹²

¹² <http://www2.le.ac.uk/offices/estates/about-estates/structure/property-services-1/maintenance> Accessed on 04/August/ 2012

Appendix 17 *Stage 1 ITS Customer Service catalogue Service range list*

Central Computing Services	Physical server
	Virtual server
	Email
	Storage
	Printing
	Desktop
	Remote desktop provision
	Securities
	SharePoint administration
	Enterprise search
	System centre suite
	Authentication AD/Dir services (DHCP)
	App-v/other virtualization
	Data-base
	Backup/ restoration
	Investigation service
Local Delivery	one to one support student/staff
	Incident support staff/student
	Research support
	Specialist technician
	Project Support
	Technical support of the venue
	Lecture/Theatre provision
	Emergency classroom support
	Maintenance routine
	Manage the software budget
	Communicate/Coordinate within IT and Faculties
	SAM and HAM
Network service	Network data wired service
	Network data wireless
	Network voice VOIP
	Network voice legacy
	Monitoring system
	security logs

	General housekeeping of data and equipment
IS	Universe
	Sonic student record
	Examination
	Solar
	NOVA
	QL
	ABW
	FMS
	iTrent (CHRIS)
	Paybase/Payabase C series
	Corporate Planner
	InfoEd (CUCV)
	SDMS
	CMIS
	Eportal
	RoomService.NET
	Interface of room service and admission parties
	Business Objects (Infrastructure, Planning, HR/iTrent)
	Filestream
	Timetable
	Clearing Hotline
	CourseApply
	AddressBook
	Admissions Sonic
	MARS Interface
	Admission interface
	Admission-Variou s
	Admission Email/SMS comms tasks
	Admissions statistics task
	BIDS
	SharePoint Developments
	Service Desk Call support
	Universe Training
	Universe Job Profiles (SONIC)
	Change and Release Management

	QL user access
	Infrastructure
	Universe user access
	HESA Student Submission
	Destination of Leavers from Higher Education (DHLE) report
	Student Number Control
	Non-completion tracking and reporting
	HE Student Early Statistics Survey
	HESA Aggregate Oversees
	Key Information Set
	Course Performance Reports
Programme Management	Project & Programme management to ITS and wider part of the university
	Design Business Model for the university
	Develop Project and Business framework
	Project Governance
	Service Design
	Resource allocation and overview of the project
	IT & info security Governance

Appendix 17.1 List of all stakeholder stage 1

2	ITS																	
3	Servers Leader	Enterprise Middleware	Desktop Leader	Service Desk	Support	Service Delivery	IT Business Partner	Procurement control	Network development	Network Support	IS Support	Management Information	Students Record	Applications programmer	Programme Management	Programme Management support	Business Analysis	Service Improvement & Security Management
4																		
5																		
6	Central Computing Services			Local Delivery			Network Services			IS			Programme Management					

Appendix 17.2 The IT service range and stakeholder matrix

Appendix 17.3 *The IT service provider requirements list*

	Provider	Service	Requirements
1	Central Computing Services, Server Team & Enterprise Middle ware	Physical server	1.Payment for ; size, capacity, memory 2. Operation sys required(to check whether it is supported or not) 3. Is the backup required? 4. Need to understand what internal-customer is trying to do in order to be able to advise on what is sensible to have
2	Central Computing Services, Server Team & Enterprise Middle ware	Virtual server	1.No need to pay unless it is a research project 2.Necessary to know the size, capacity, memory required 2. Operation sys required(to check whether it is supported or not) 3. Need to understand what internal-customer is trying to do in order to be able to advise on what is sensible to have
3	Central Computing Services Server Team	Email	*This service gets provided to the all enrolled staff *The info is got from HR payroll sys
4	Central Computing Services Server Team	Storage	1. The service automatically gets provided to the all enrolled staff 2. In case of a need to increase the storage capacity, the project need to fund it (depending on the available vs. required capacity)
5	Central Computing Services Server Team	Printing	* As the project is ended the actual delivery of service is done by local delivery now. *Currently only provide physical servers and print queue
6	Central Computing Services Desktop leader	Desktop	1. Operating system & image 2.Application; based on different user and M/C that can differ 3.list of what is it that you want to install on your system? 4. Reasonable degree of notice to do the work 5. Based on the project clear definition of personal engagement of each person within the project
7	Central Computing Services, Server Team & Enterprise Middle ware	Remote desktop provision	*CU to work, CU to study 1. the service is automatically been set for each user, unless there is a need to have additional application on the system which then they need to send the request for
8	Central Computing Services Server Team	Securities	* This service is done without a request everyday by the team. 1. Scan the machines is case there is a problem the responsible person in IT to solve either before or after the live launch
9	Central Computing Services Enterprise Middle ware	SharePoint (Doc management)	1. SharePoint platform will be set for the "project" which the request been raised by the project management *the team make sure the platform runs (monitor), however nothing is done regarding the operating side of the service.
10	Central Computing Services Enterprise Middle ware	Enterprise search	*the service is expected without asking * this is a feature of an application
11	Central Computing Services Server Team	System centre suite	*this is a monitoring tool within the Central Computing Service(tool to manage our service) 1. Check the system is up and running 2. deploy the application 3. manage the M/c
12	Central Computing Services Server Team	Authentication AD/ Dir services (DHCP)	*The service is basically on how you log on *Automated/provision service which gets provided to Staff and students *HR/student record to get the info
13	Central Computing Services Server Team	App-v/ other virtualization	*Internal service helps to deploy the application
14	Central Computing Services Server Team	Data bases	1. Need to have conversation around the project to understand who is running the project 2. Up-front chat on whether its SQL-Server or AROCEL-server (so that the project team don't choose applications which doesn't get supported.
15	Central Computing Services, Server Team & Enterprise Middle ware	Back up/ restoration (Server, SQL, SharePoint Backup)	*In general data get kept for 8 weeks 1. If sth especial is needed to be backed up, project team need to ask within this 8 weeks 2. Project team need to communicate "what" needs to be backed up and for "how long"
16	Central Computing Services Enterprise Middle ware	Investigator service	*This is done when been asked by heads to see what the specific person is doing *Asked based on investigation of brigades and it entirely depends on the cases

	Provider	Service	Requirements
1	Local Delivery, Service Desk	One to one support student/ staff	The support is provided within the whole university for all the machines but not all the software. (Work-flow for process of the service request is in place, however the set of question to be asked in each case is based on the training already been provided to Service Desk staff and their experience) The main role of service desk is to supply the correct info to Support team in case the incident couldn't be solved by them.
2	Local Delivery, Service Desk	Incident support staff/student	Any initial fault through out the IT gets supported by the Service desk. (Work-flow for process of the service request is in place, however the set of question to be asked in each case is based on the training already been provided to Service Desk staff and their experience) The main role of service desk is to supply the correct info to Support team in case the incident couldn't be solved by them.
3	Local Delivery, Support	Research support	The Support service is second line support incidents. Procurement work for the research project, to advise on IT equipment requirements. The support team requires to make right diagnose and in case of requirements pass information to Service Delivery.
4	Local Delivery, Support	Technical support of the venue	Support any venue within the University technically.
5	Local Delivery, Support	Specialist technician	The Support service is second line support incidents. The team support the specialist in each faculty (joint of IT with Specialist knowledge) The support team requires to make right diagnose and in case of requirements pass information to Service Delivery.
6	Local Delivery, Support	Clearing Hotline	Local delivery is not the owner of this service but in some special occasion get involved.
7	Local Delivery, Support	Project support	The Support service is second line support incidents. For instance clearing the project closure The support team requires to make right diagnose and in case of requirements pass information to Service Delivery.
8	Local Delivery, Service delivery	Lecture/Theatre provision	*This service is a daily check to make sure all the lectures and theatres are ready to be used by academic and students.
9	Local Delivery, Service delivery	Emergency classroom Support	in case of incident or fault the team is prepared to solve the problem.
10	Local Delivery, Service delivery	Printing	*This is a support service in making sure the papers and tuners are in ready to be used condition.
11	Local Delivery, Service delivery	Desktop	Mainly on hardware diagnosis and image deployment
12	Local Delivery, Service delivery	Maintenance routine	*Monthly maintenance routine for classrooms and labs. First line support of equipment/servers for the delivery of the service.
13	Local Delivery, Procurement Control	Manage software budget	*Controlling the budget for all the software need to be bought. Procurement Control service is more on "new equipment and Software licences" rather than the incidents. Buying Software licences through out the university, and very much work with faculties to help the budget and manage the major changes. Business case and request form need to be provided to procurement team.
14	Local Delivery, IT Business Partners	Communicate/Coordinate within Its & Faculties	Overall services from all the Its services to look at working relationship as well as the requests the both parties might have.

	Provider	Service	Requirements
1	Network Development/Support	Network Data Wired	Service request (repeatable common work); 1-Port Number (is the main information required prior to put the service in place). 2-Mac address 3-Ip address 4-Location 5-User name
2	Network Development/Support	Network data wireless	Service request (repeatable common work); 1-Port Number (is the main information required prior to put the service in place). 2-Mac address 3-Ip address 4-Location 5-User name
3	Network Development/Support	Network voice VOIP	Service request (repeatable common work); 1-Port Number (is the main information required prior to put the service in place). 2-Mac address 3-Ip address 4-Location 5-User name
4	Network Development/Support	Network voice legacy	Service request (repeatable common work); 1-Port Number (is the main information required prior to put the service in place). 2-Mac address 3-Ip address 4-Location 5-User name
5	Network Development/Support	Monitoring system	*Looking for signs of failure and based on alerts we might make decision to change the system.
6	Network Development/Support	Security logs	* The service which is provided by the Network team to the whole university on daily bases.
7	Network Development/Support	General housekeeping	*on data, equipment's, report writing
8	Network Development/Support	Variable one-offs problems	Depending on the problem the information required can be different however the 1-5 set of information required remains the same.
All the services provided by the Network team, gets developed by Network Development team and then hands over to Network support team.			
	Key Notes		
		Supporting service	
		Internal service to Central Computing services	
		* Service automatically gets provided without any request	

	Provider	Service	Requirements
1	Information Systems/ Students record	Universe (service used by only staff)	Develop and Maintain what makes up all the Universe sections. Need info on; - Process changes (usually the info comes from Academic registry) -Changes to business (info from Academic registry) -Any data change; from the people who administer the basic infrastructure -Business specification, Business requirements on new developments (it can be directly from finance, academic registry or from Programme management). *Reports done on regular basis, as well as setting the system to send out required report in expected dates; e.g. the student check-in weekly report to University Compliance team.
1.1	Information Systems Support	Universe (service used by only staff)	IS Support; deals with problems logged by service desk call support (the problem couldn't be solved get passed to Student record team) Support on: -Enrolment -Attaching module -Dates change/check -Attendance monitoring
1.2	Information Systems Support	Universe Training (service used by only staff)	Provide training to staff to be able to do data extraction & use student record& general overview The requirements is; -List of staff who need to have access to the universe (The info comes from HR) -Data extraction requirement; have they have any particular report that they require data for
1.3	Information Systems/ Support	Universe Job Profiles(Sonic)	There are set of roles within the job profiles (roles on universe by programmer) creating/maintaining the job profile in conjunction with academic registry. Allow the access depending on who the task user is.
1.4	Information Systems/ Support	Universe user Access	Based on the job profile the access can be changed, i.e. the user needs to be existing user. After the request been logged it need to be authorised by academic registry.
2	Information Systems/ Students record	Sonic student record	Any new development of the Universe is done on Sonic.
3	Information Systems/ Students record	Examination	The Exams subsystem is essentially a sub-set of the Student Records functionality so, at a high level, it's no different from the rest of Universe in terms of service provision or requirements. It consists largely of the storage and processing of student-related assessment data, and the production of results and documents (transcripts, certificates, etc.). Thus it is Academic Registry (and therefore Faculty Registries) who
3.1	Information Systems Support	Examination	After faculties input the marks, produce results letter & script Final Graduation certificate Manage Graduation ceremony Data Problem; for the problems need to be fixed e.g. data change on marks and outcome of final results. -Queries for changes come from registry.
4	Information Systems/ Students record	Solar	Student facing service. It gets develop and maintain by the IS Student Record team. Nova is replacing Solar.
5	Information Systems/ Students record	NOVA	NOVA is replacing Solar & any new development goes to NOVA. The information mostly comes from Academic registry , or Programme management.
6	Information Systems Application	QL	QL is a Finance application which is going to be replaced by ABW and therefore at the moment the Application team support any incident on the application only.
6.1	Information Systems Support	QL	IS Support: Developing and creating company & daily support for scheduler, Complete process of payment -Info by finance are std information in odd cased for further info contact finance - Authorisation form * Supporting the scheduler is a daily job done by IS Support In case any of the jobs get stock, try to check and fix if not resolved pass it to 3rd parties

7	Information Systems/ Application	ABW	ABW is a Finance application. Not in use/live yet.
7.1	Information Systems Support	ABW	New finance sys; It is in development phase still and will be released Sep 2013
8	Information Systems/ Application	FMS	FMS reports is done by Application team, however the main supplier of the service is Middleware team. The service is used by Finance team.
9	Information Systems/ Application	iTrent(CHRIS)	It has got two parts; -The main part which contains: Holiday, Payroll -The Recruitment part Full service is provided by Application team on that.
10	Information Systems/ Application	Paybase	Paybase has got two versions; -old version and Paybase C series. The application is used by Payroll, HR, Finance, and Student services (in general any payments, DDs and refunds from the University is made through this system).
11	Information Systems/ Application	Corporate Planner	The installation and upgrade is done by the Application team. The application is used by Finance team.
12	Information Systems/ Application	InfoEd(CUCV)	It is a third party system, used by Data input team. -InfoEd Webservices -InfoEd SharePoint
13	Information Systems/ Application	SDMS	The Application team support the trouble-shooting on that. The service is used by Learning and Development team at Uni.
14	Information Systems/ Application	CMIS	CMIS is a timetabling software, and the Application team provide full service i.e. install, upgrade, trouble shooting to keep the third party software running, on that. It has been used by timetabler in registry.
15	Information Systems/ Application	ePortal	ePortal is a webversion of the CMIS.
16	Information Systems/ Application	RoomService.NET	RoomService.NET is an accommodation service, used by student accommodation team at uni. The full service i.e. Install, upgrade, trouble-shooting is provided on that.
17	Information Systems/ Application	Interface of roomservice & Admission parties	The Application team don't have control over it, except changing the code.
17	Information Systems/ Application	Business Objects	The service contains; -Planning -Infrastructure -HR/iTrent The key users are Registry and HR
18	Information Systems/ Application	File stream	File Stream is a document management system for storage. It is used by IO.
19	Information Systems/ Application	Timetable	Timetable is an in house system and it uses data from CMIS, and it is used by Student Registry.
20	Information Systems Application	Clearing Hotline	The Application team works as third line support on that, and responsible for making sure the systems are running up and available to be used.
20.1	Information Systems Support	Clearing Hotline	The service gets provided only during Jun-July-August, and it's a sys that displays information of University admission requirement for clearing applicant. To do so, the IS Support makes sure the faulty staff have access to required section of universe, and check and chase the clearing list. - Faculties need to put the information in (to do that they need to have access to universe)

21	Information Systems/ Application	CourseApply	It comes from the UCAS application, and it is used by IO, RAO (PG,PT)
22	Information Systems/ Application	AddressBook	Available for whole staff to be used.
23	Information Systems/ Application	Admissions Interface	As it is interface it seats in the background, and it is used by RAO, IO.
24	Information Systems/ Application	MARS Interface	The application team work on that as a thried party service provider. The interface is used by IO.
25	Information Systems/ Application	Admission-Various	The access is done by server team.
25.1	Information Systems Support	Admission-Various	*It is an everyday report which highlights the Universe admission and UCAS. Relays it with RAO staff, and faculty admission staff.
25	Information Systems/ Application	Admission-Email/ SMS Comms Tasks	
25	Information Systems/ Application	Admission Dataharvesting Import Task	
25	Information Systems/ Application	Admissions Statistics Task	It provides information for other systems, as well as shows how many students been applied. It is used by Academic and Senior staff.
26	Information Systems/ Application	BIDS	It records all the bids information and it get used by BDSO.
27	Information Systems/ Application	SharePoint	SharePoint has two sections; -Student Portal; used by students -Staff-net Portal; used by Departments The application team only support the application and main service is provided by Middleware team.
28	Information Systems/ Support	Service Desk Call Support	Take the calls that been assigned by the service desk to IS Support team, classify the issues and work on them. The issues either get solved by the team, or get passed to third-line support to be solved. Depending on the nature of the concern there are different set of info required such as; -Screen shot -Description of what is not working? -Authorisation of finance (for QL) or Academic registry (for Universe) -Nature of their role in the uni (Name/ID).
29	Information Systems/ Support	Change and Release Management	It is about all the new changes which does not exist at the moment. The request of the change need to be logged by Service Desk, with the justification in format of business case, which then needs to be authorised by the area owns the service. After authorisation, the team start to work on it and report the progress on weekly meeting.
30	Information Systems Support	QL user access	It has similar set up as a Universe user access, the only difference is the authorisation needs to be done by Finance.
31	Information Systems Support	Infrastructure	The main owner of the service is QRS in academic registry, and IS Support work on cases which requires change. The info comes from QRS.
32	Information Systems/ Management Information	HESA Student Submission	
33	Information Systems/ Management Information	Destination of Leavers from Higher Education (DLHE) report	
34	Information Systems/ Management Information	Student Number Control	
35	Information Systems/ Management Information	Non-completion tracking and reporting	

36	Information Systems/ Management Information	HE Students Early Statistics Survey	
37	Information Systems/ Management Information	HESA Aggregate Oversees	
38	Information Systems/ Management Information	key information Set	
39	Information Systems/ Management Information	Course Performance Reports	
40	Information Systems Support	OMIS	It is done via QL orders for BDSO, and the required info are; -Dates, Time -Info on order -Company/supplier info In case there is any error to edit and report them.

	Provider	Service	Requirements
1	Programme Management	Project and Programme management	The service is got provided to the ITS and the wider part of the university. -Scope -Responsibility -Budget -Aim and benefits -Resource required -The Work package
2	Programme Management & Business Analyst	Design Business Model for the University	The service is done through reviewing the process map to design business model. The requirement are as fallow; - Technical specification - Business case - Project scope -Bench marking - Management and tracking
3	Programme Management & Business Analyst	Develop projects and Business framework	The requirement are as fallow; - Technical specification - Business case - Project scope -Bench marking - Management and tracking
4	Programme Management	Project Governance	The requirement are as fallow; - Technical specification - Business case - Project scope -Bench marking - Management and tracking
5	Programme Management & Business Analyst	Service design	This service rely on Business analysis team to start their job. The requirement are as fallow; - Business case -Define a service by Business Model
6	Programme Management	Resource allocation and overview of the project	Information about; - What work they been doing? - What resource is required?
7	Service Improvement & Security Management	IT and information security Governance	The service is part of the design the Programme management team does, including; -Risk management -Information security advise -Security incident; in which each area within the IT works on it as the first line defence, and the one with major security issues get passed to Security Management within the Programme management. Need to know; -Business case -every significant change go through a managed change route. -any contract with 3rd parties.

Appendix 18 *Stage 5, case 2*

				Comparison	A1	A2	A3	A4	A5	A6	A7	A8		%
A1	Approved Granted HTS	UKBA		A1			A1	A4	A5	A6	A1	A8	2	7.1
A2	Granted Tier 4 till end of education period			A2			A3	A4	A5	A6	A2	A8	1	3.6
A3	Inform if the student granted visa haven't enrolled			A3				A3,A4	A3	A6	A3	A3,A8	6	21.4
A4	Directory of student data			A4					A4	A6	A4	A8	4	14.3
A5	Maintain the HTS status			A5						A6	A5	A8	3	10.7
A6	Current and satisfactory full inspection, audit, review			A6							A6	A6	6	21.4
A7	sustainable system in place to enable sponsor duties			A7								A8	0	0.0
A8	Report student status interaction university endorsed to use for sponsor management			A8									6	21.4
												28	3.6	100.0

			Comparison	B1	B2	B4	B5	B6	B7		%
B1	Easy to access the monitoring system	International student	B1		B2	B4	B1	B6	B7	1	6.7
B2	The reporting doesn't need extra time allocation		B2			B2	B2	B7	4	26.7	
B3	Maintain my student visa during the study		B4			B4,B5	B4	B7	2	13.3	
B4	advise on any changes which may put my visa on risk		B5				B5	B7	2	13.3	
B5	Accessible staff to facilitate & advise the process of visa from pre-arrival, arrival, on course, and post study							B7			
B6	Clear notification of my duties to maintain my visa on course		B6							1	6.7
B7	The system is helpful and efficient in a way that I can trust any problem I have can be resolved quickly		B7							5	33.3
										15	6.7
										100.0	

			Comparison	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11		%	
C1	System which allow us to keep and monitor accurate student record	UKBA Compliance Uni team	C1			C2	C3	C1	C5	C1,C6	C7	C8	C1,C9	C10	C1,C11	4	6.5
C2	Able us to produce reports from system data to be updated and confirmed by schools					C3		C2	C5	C6	C7	C8	C9	C10	C11	1	1.6
C3	Have the option to produce report on tier4 students to UKBA							C3,C4	C5	C6	C7	C3	C3	C10	C11,C3	6	9.7
C4	Issue CAS								C5	C6	C7	C4,C8	C9	C10	C11	2	3.2
C5	Flexible to be updated by relevant UKBA regulations and any changes								C5	C5	C5	C5	C5	C5	C5	9	14.5
C6	To be able to hold the relevant documents for each students in the system										C7	C6,C8	C6,C9	C6	C11	6	9.7
C7	A systems which highlights the not attending student within the expected period											C7	C7	C7	C11	8	12.9
C8	Permission to update and maintain students' personal details on the system												C8	C10	C8,C11	6	9.7
C9	Able us to have an overall set of information on students files been uploaded without going through different files													C9	C11	4	6.5
C10	Attendance monitoring														C10,C11	7	11.3
C11	Have the option to make us able to track the student with changed circumstance															9	14.5
															62	1.6	

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				Comparison	F1	F2	F3	F4		%
F1	Service ownership around it	IT		F1			F1	F1	3	42.9
F2	Governance and policies around the service			F2			F2	F4	1	14.3
F3	ongoing reviews			F3			F3,F4		1	14.3
F4	Monitoring of the service incase of sustainability			F4					2	28.6
									7	100.0

Appendix 19 *Course and Module creation stage 4*

<div> <div>Guides & Std</div> <div> <div>Policy & Rules</div> <div>Stakeholders</div> <div>Service-Attribute</div> </div> </div>		Service Range													
			Course/ Module creation												
			Vice-Chancellor group	JISC	IT Department	Academic Registry	Marketing & communication department	International office	Staff-Support & academic	Senior Administration in Faculties	Administration in Faculties	Prospective customers	Webpage Marketing Ltd	International office and agents	QAA
			AIS	AIS	AIS	AIS	AIS	AIS	SP	AIS	AIS	SR	AIS	AIS	SR
A1	to have complete JISC project on specified time frame	Vice-Chancellor													
B1	XML feed that complies with XCRI-Cap	JISC													
B2	To use the project budget effectively to look at the project within the time frame	JISC													
C1	Streamline the process	IT													
C2	Automate the process														
C3	Reduce the paperwork														
C4	Can be done by many people simultaneously														
C5	Common business process between faculties														
C6	Make it easier for academics														
C7	Reduce administration task for registry & academic	Program management													
C8	Increase collaboration working														
C9	Single Repository for course data														
C10	Interoperability between related systs														
C11	Reduce process costs														
C12	Reduced manual elements														
C13	XML feed that complies with XCRI-Cap														
C14	Process works on mobile application														
C15	Identify collaborative working opportunities														
C16	Shared work and reduced double entering data														
C17	Creation of the course prospect														
C18	Supply detailed required data														
C19	Market/sell the org to wider customer														
D1	User friendly (layout*)	Registry													
D2	Bug free														
D3	all doc in one place accessible to different people														
D4	Can track where are the course in case of approval process														
E1	Accurate data for marketing website	Marketing													
F1	Simple to use, Easy to understand the version	Academic													
F2	Stage by stage instruction														
F3	Instruction for where the file is														
F4	Being able to share it between everyone														
F5	Successful course ready to market and recruiting on-time for potential customer														
F6	Eliminate duplication of info in different ways (KU, PA,...)														
F7	repository of common data														
F8	When the student enrol the course set correctly link between doc and student														
G1	Sth to help us to develop the market on course/module in start (stronger support externally)	Senior Faculty													
G2	Coloration between other faculty so they don't deliver the same content that other are offering														
G3	A how to design content is missing(business development team is required)														
G4	get it right in the beginning														
G5	stronger guidance														
H1	Clear credit allocated to the module	Student													
H2	Description of how the module is delivered and the hrs allocated against it														
H3	Information on funding and exchange student														
I1	Improved data quality	QAA													
I2	Greater dissemination of knowledge														

Appendix 19.1 *Stage 5, pairwise comparison, case 3*

			Comparison	A1	C11	C19	F5		%
A1	to have complete JISC project on specified time frame	Vice-Chancellor	A1	A1	C19	F5	1	14.3	
C11	Reduce process costs		C11		C11	F5	1	14.3	
C19	Market/sell the org to wider customer		C19			F5,C19	2	28.6	
F5	Successful course ready to market and recruiting on-time for potential customer		F5				3	42.9	100.0
								7	14.3
			Comparison	B1	B2			%	
B1	XML feed that complies with XCRI-Cap	JISC	B1		B1	0	0.0		
B2	To use the project budget effectively to look at the project within the time frame		B2			1	100.0	7.0	
							1	100.0	

			Comparison	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	F1	F4		%	
C1	Streamline the process	IT	C1		C1																				10	4.2	
C2	Automate the process		C2		C2	C4	C5	C2	C2	C8	C9	C10	C11	C1	C1	C2	C13	C2	C2	C16	C17	C18	C2	F1	F4	8	3.4
C3	Reduce the paperwork		C3		C4	C5	C3	C3	C3	C3	C3	C10	C11	C3	C12	C3	C3	C15	C16	C17	C18	C3	F1	F4	8	3.4	
C4	Can be done by many people simultaneously		C4				C5	C6	C7	C4,C8	C4,C9	C10	C11	C4	C4	C4	C4	C4	C4	C4	C4	C4	F1,C4	C4,F4	14	5.9	
C5	Common business process between faculties		C5					C5	C7	C5,C8	C5	C10	C11	C5	C5	C5	C5,C15	C5	C5	C5	C5	C5	C5	F4	16	6.8	
C6	Make it easier for academics		C6								C6,C7	C8	C9	C10	C11	C6,C12	C6	C6	C15	C6,C16	C17	C18	C6	C6,F1	F4	8	3.4
C7	Reduce administration task for registry & academic		C7								C7	C9	C10	C11	C7,C12	C7	C7	C7	C7,C16	C17	C18	C7	C7	F4	11	4.6	
C8	increase collaboration working		C8									C8,C9	C10	C8	C8	C8	C8	C8	C8,C15	C8,C16	C17	C18	C8	F1	F4	13	5.5
C9	Single Repository for course data		C9										C9,C10	C9	C9	C9	C9	C9	C9	C9	C9	C18	C9	C9	F4	16	6.8
C10	Interoperability between related systs	Program management	C10										C10	C10	C10	C10	C10	C10	C10	C10,C18	C10	C10	C10	20	8.4		
C11	Reduce process costs		C11											C11	C11	C11	C11,C16	C11	C18	C11	C11	F1	C11	15	6.3		
C12	Reduced manual elements		C12												C12	C12	C12	C16	C12	C12,C18	C12	C12,F1	C12	13	5.5		
C13	XML feed that complies with XCRI-Cap		C13													C13	C13	C15	C16	C13	C18	C19	F1	F4	3	1.3	
C14	Process works on mobile application		C14														C14	C16	C17	C18	C19	F1	F4	1	0.4		
C15	Identify collaborative working opportunities		C15															C16	C16	C15	C18	C15	F1	N/A	7	3.0	
C16	Shared work and reduced double entering data		C16																C16	C16,C18	C16	C16,F4	17	7.2			
C17	Creation of the course prospect		C17																		C18	C19	F1	F4	7	3.0	
C18	Supply detailed required data		C18																		C18	C18	C18	18	7.6		
C19	Market/sell the org to wider customer		C19																				F1	C19	4.0	1.7	
F1	Simple to use, Easy to understand the version		F1																					F1,F4	14	5.9	
F4	Being able to share it between everyone		F4																						14	5.9	
																									237	0.421941	
																										100	

D1	User friendly (layout*)	D1	D4	C3	D1	C7	D1	D1	D1	C12	D1	C16	D1,C18	D1,F1	D1,F3	D1,F4	D1	F8	I1	D1	12	5.0			
D2	Bug free	D2	D4	D2	D2	D2,C4	C7	D2	C10	D2,C12	D2	C16	C18	D2,F1	D2	D2	D2	F8	D2,I1	N/A	14	5.8			
D3	all doc in one place accessible to different people	D3	D4	C3	D3,C4	C7	C9	C10	C11	C12	C15	D3,C16	C18	D3	D3,F3	D3,F4	F7	F8	I1	D3	5	2.1			
D4	Can track where are the course in case of approval process	D4	D4	D4	D4	D4	D4	D4	D4	D4	D4	D4	D4	D4	N/A	D4	F7	D4	D4	D4	17	7.0			
C3	Reduce the paperwork	C3					C3	C7	C3	C3	C3	C3,C12	C3	C16	C18	F1	F3	C3	F7	F8	I1	C3	10	4.1	
C4	Can be done by many people simultaneously	C4					C7	C9	C10	C11	C12	C4	C16	C18	F1	C4	C4,F4	F7	F8	I1	I2	5	2.1		
C7	Reduce administration task for registry & academic	C7					C7	C7	C7	C7	C7	C7	C7	C18	F1	F3	C7	C7	F8	C7	I2	14	5.8		
C9	Single Repository for course data	C9								C9,C10	C9	C9	C16	C18	C9,F1	C9	C9,F4	C9,F7	F8	I1	I2	10	4.1		
C10	Interoperability between related systs	C10									C10	C10	C10	C10	C10	C10	C10,F4	C10,F7	C10,F8	C10,I1	I2	14	5.8		
C11	Reduce process costs	C11										C12		C11,C15	C16	C18	F1	C11	F4	F7	F8	I1	I2	4	1.7
C12	Reduced manual elements	C12											C12	C12,C16	C18	F1	C12	C12	C12	F8	I1	I2	12	5.0	
C15	Identify collaborative working opportunities	C15												C16	C15	F1	C15	F4	F7	F8	I1	I2	4	1.7	
C16	Shared work and reduced double entering data	C16													C16,C18	C16,F1	C16	C16,F4	C16,F7	F8	C16,I1	I2	16	6.6	
C18	Supply detailed required data	C18														C18	C18	C18	F7	F8	C18,I1	I2	14	5.8	
F1	Simple to use, Easy to understand the version	F1															F1	F1	F1,F8	F1,I1	I2	15	6.2		
F3	Instruction for where the file is	F3																F4	F7	F8	I1	I2	5	2.1	
F4	Being able to share it between everyone	F4																	F4,F7	F8	I1	I2	10	4.1	
F7	repository of common data	F7																		F8	I1	I2	12	5.0	
F8	When the student enrol the course set correctly link between doc and student	F8																		F8	I1	I2	17	7.0	
I1	improved data quality	I1																			I1,I2	I2	17	7.0	
I2	Greater dissemination of knowledge	I2																					15	6.2	
																								242	0.413223
																									100

				Comparison	H1	H2	H3	F8	I1	I2		%	
H1	Clear credit allocated to the module	Student		H1		H1,H2	H1,H3	H1	I1	I2	3	15.8	
H2	Description of how the module is delivered and the hrs allocated against it			H2			H2,H3	H2	H2	I2,H2	5	26.3	
H3	Information on funding and exchange student			H3				H3	H3	I2	4	21.1	
F8	When the student enrol the course set correctly link between doc and student			F8					F8	F8	2	10.5	
I1	improved data quality			I1						I2,I1	1	5.3	
I2	Greater dissemination of knowledge			I2							4	21.1	100.0
											19	5.3	
I1	improved data quality	QAA											
I2	Greater dissemination of knowledge												
				Comparison	C18	C19	F8			%			
C18	Supply detailed required data	IO		C18		C18,C19	F8	1	25.0				
C19	Market/sell the org to wider customer			C19			C19	2	50.0				
F8	When the student enrol the course set correctly link between doc and student			F8				1	25.0	100.0			
								4	25.0				

Appendix 19.2 *Stage 6, balanced and prioritised VOS, (case 3)*

	VOS	Stakeholders	
F5	Successful course ready to market and recruiting on-time for potential customer	AIS	Fundamental
D4	Can track where are the course in case of approval process	AIS	
G3	A how to design content is missing(business development team is required)	SP	
G1	Sth to help us to develop the market on course/module in start (stronger support externally)	AIS	
F8	When the student enrol the course set correctly link between doc and student	AIS	
B2	To use the project budget effectively to look at the project within the time frame	AIS	More is better
C10	Interoperability between related systs	AIS	
I1	improved data quality	AIS/SR	
E1	Accurate data for marketing website	AIS	
I2	Greater dissemination of knowledge	SR	
C19	Market/sell the org to wider customer	AIS	

Appendix 19.3 Stage 7, VOS to Value-drivers (case 3)

[illegible]

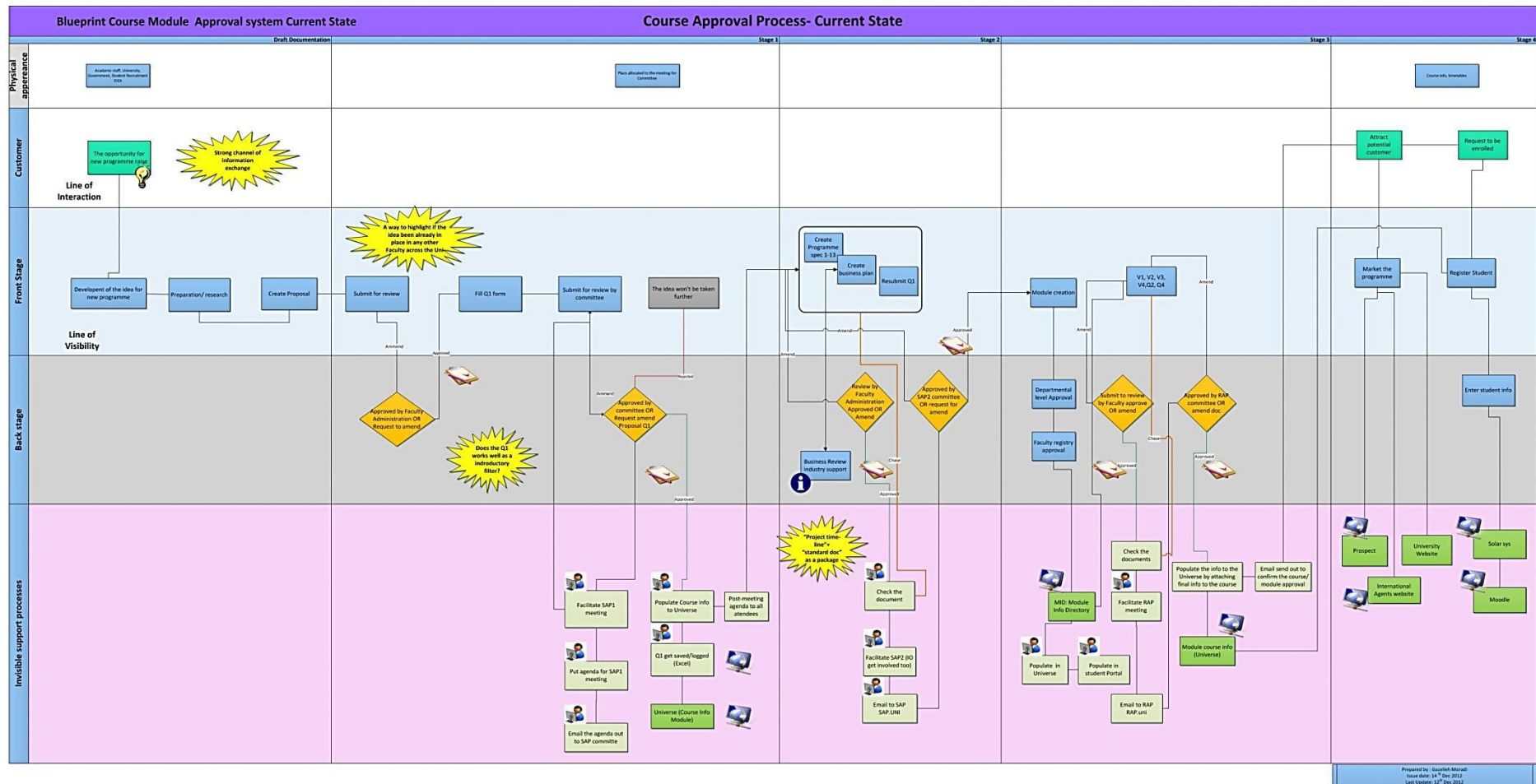
Appendix 19.4 Case 3 forms (output) description

- Initial Course proposal (Q1) ;
- Document Submission form (Q2)
- Record of module approval (Q4)
- Volume 1: Programme Specification (Part 1) and Supporting Information (Part2)
- Volume 2: A set of relevant module descriptors
- Volume 3: A resources document:
- Volume 4: A critical review of the current programme: This document must reflect the annual course reports for the period since the most recent approval/review of the course(s) and identify perceived strengths and weaknesses of the current course, relating these to proposed changes where appropriate
- M1: Publicity and marketing plan

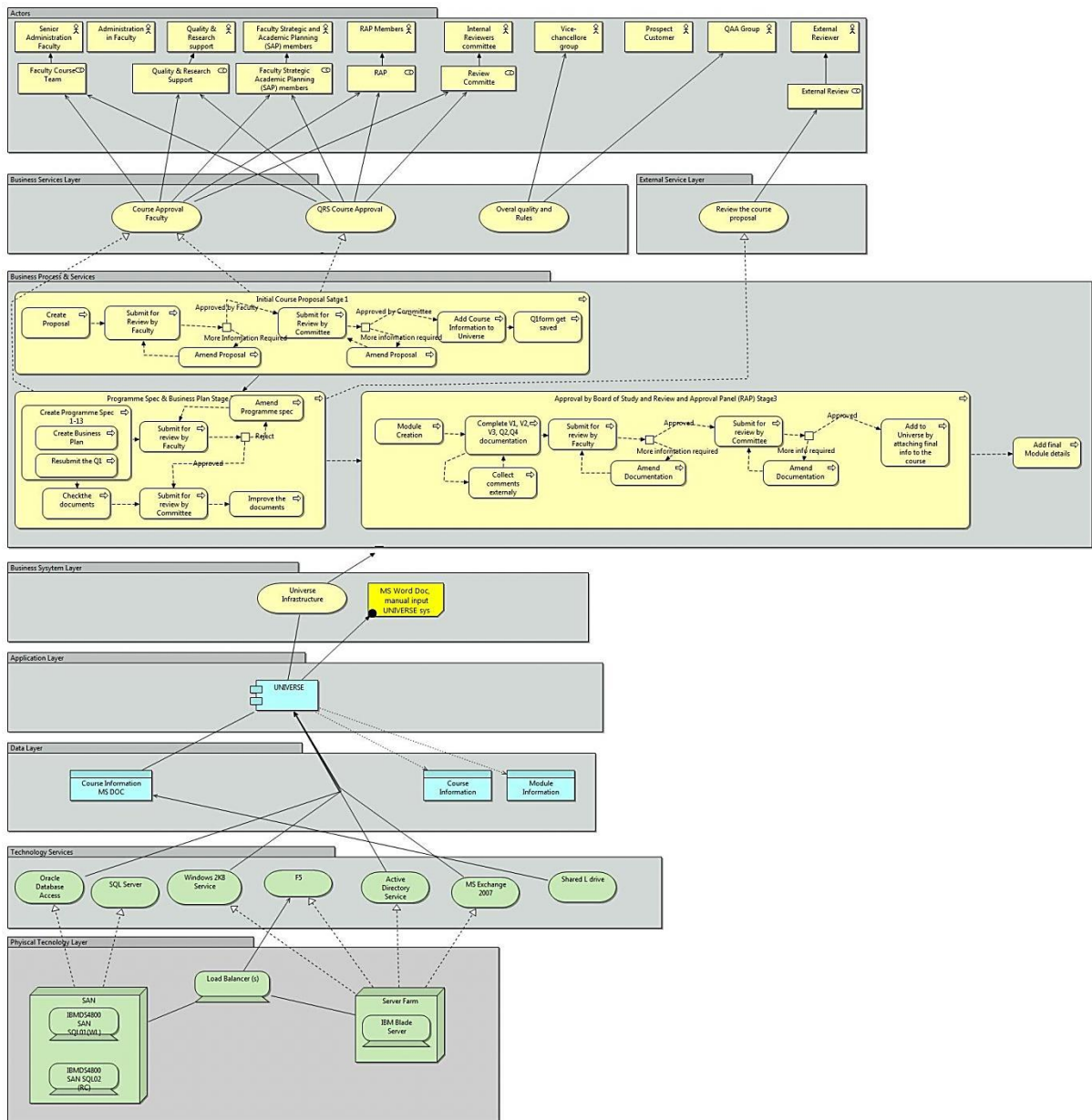
Appendix 19.5 *Stage 8, The Gap (case 3)*

Stage	Actual Output	Value		Expected Output
Draft Documentation	New prog Proposal	F5	The course with involvement of marketing experts building up a marketable course	Marketable, Business-Academic, New prog Proposal for a specific audience
		G3	Content covering the most updated academic and business knowledge by involving business partners as well as academic subject expert	
		G1	Academic involvement with business cases prior to the draft concept stage	
		B2	The improvement/change takes place within the introduced time frame by the budget provider(JISC)	
		I2	Evaluating level of the audience knowledge prior to the designing the content	
Stage 1	Q1 form; Initial course proposal	C19	Having accurate marketing data to decide about wider potential customer	Streamlined process with interoperable systems and reliable data
		D4	Streamlined process with efficient communication route, for the progress of course/module approval, to the Stakeholders	
		C10	Interoperability between systems to eliminate any input duplications	
		I1	Continuous review of data to fit with current and up-to-date knowledge (Improved data quality)	
Stage 2	Prog spec Business plan Q1	I2	Evaluating level of the audience knowledge prior to the designing the content	
		D4	Streamlined process with efficient communication route, for the progress of course/module approval, to the Stakeholders	
		C10	Interoperability between systems to eliminate any input duplications	
		I1	Continuous review of data to fit with current and up-to-date knowledge (Improved data quality)	
Stage 3	M1, V1, V2, V3, V4, Q2, Q4, V4	I2	Evaluating level of the audience knowledge prior to the designing the content	
		D4	Streamlined process with efficient communication route, for the progress of course/module approval, to the Stakeholders	
		C10	Interoperability between systems to eliminate any input duplications	
		I1	Continuous review of data to fit with current and up-to-date knowledge (Improved data quality)	
Stage 4	Module/course, Marketing	I2	Evaluating level of the audience knowledge prior to the designing the content	
		F5	The course with involvement of marketing experts building up a marketable course	Clear Marketing strategy(i.e. audience, method, time) with reliable enrolment sys
		F8	reliable enrolment system linked with correct doc	
		E1	Provide required data by the marketing team from the Academic expert/Marketing team within the set milestone in project plan	
		C19	Having accurate marketing data to decide about wider potential customer	

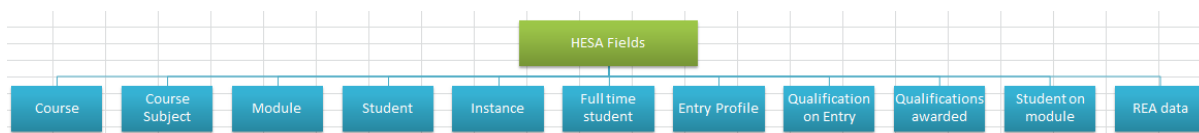
Appendix 19.6 *Stage 8, working towards future state (case 3)*



Appendix 19.7 EA diagram of Course and Module current state



Appendix 20 *HESA report fields and sub-fields*



1SF Course

- 1 [Course identifier \(COURSEID\)](#)
- 2 [Reduced course return indicator \(REDUCEDC\)](#)
- 3 [General qualification aim of course \(COURSEAIM\)](#)
- 4 [Course title \(CTITLE\)](#)
- 5 [Teacher training course \(TTCID\)](#)
- 6 [Bilingual ITT marker \(BITTM\)](#)
- 7 [Teaching qualification sought sector \(TQSSEC\)](#)
- 8 [Collaborating organisation \(COLLORG\)](#)
- 9 [Closed course \(CLSDCRS\)](#)
- 10 [FE general qualification aim \(FEQAIMC\)](#)
- 11 [Major source of funding \(MSFUND\)](#)
- 12 [Regulatory body for health and social care students \(REGBODY\)](#)

2SF Course Subject

- 13 [Subject of course \(SBJCA\)](#)
- 14 [Subject percentage \(SBJPCNT\)](#)
- 15 [Subject of ITT Specialism indicator \(ITTSUBJECT\)](#)

3SF Module

- 16 [Module identifier \(MODID\)](#)
- 17 [Module title \(MTITLE\)](#)
- 18 [Module taught in a Celtic language \(MODLANG\)](#)
- 19 [Percentage of module taught in Celtic language \(LANGPCNT\)](#)
- 20 [Module FTE \(FTE\)](#)
- 21 [Percentage not taught by this institution \(PCOLAB\)](#)
- 22 [Credit transfer scheme \(CRDTSCM\)](#)
- 23 [Credit value of module \(CRDTPTS\)](#)
- 24 [Level of credit points \(LEVLPTS\)](#)
- 25 [Other institution providing teaching \(TINST\)](#)
- 26 [Subject of module \(MODSBJ\)](#)
- 27 [Cost centre \(COSTCN\)](#)
- 28 [Subject / cost centre percentage \(MODSBJP\)](#)

4SF Student

- 29 [HESA unique student identifier \(HUSID\)](#)
- 30 [Unique Learner Number \(ULN\)](#)
- 31 [UCAS Personal Identifier \(UCASPERID\)](#)
- 32 [Scottish Candidate Number \(SCN\)](#)
- 33 [Institution's own identifier for student \(OWNSTU\)](#)
- 34 [Date of birth \(BIRTHDTE\)](#)
- 35 [Family name \(SURNAME\)](#)
- 36 [Forenames \(FNAMES\)](#)
- 37 [Family name on 16th birthday \(SNAME16\)](#)
- 38 [Gender \(GENDER\)](#)

39	Nationality (NATION)
40	Ethnicity (ETHNIC)
41	Disability (DISABLE)
42	Dependants in reporting year (SDEPEND)
43	Welsh speaker indicator (WELSSP)
44	National identity (NATIOND)
45	Term-time accommodation (TTACCOM)
46	Term-time postcode (TTPCODE)
47	Religion or belief (RELBLF)
48	Sexual orientation (SEXORT)
49	Gender identity (GENDERID)
5SF	Instance
50	Student instance identifier (NUMHUS)
51	Reduced instance return indicator (REDUCEDI)
52	Course identifier (COURSEID)
53	Campus identifier (CAMPID)
54	Institutions own campus identifier (INSTCAMP)
55	Research council student (RCSTDNT)
56	Research council student identifier (RCSTDID)
57	Start date of instance (COMDATE)
58	Mode of study (MODE)
59	Change of mode date (MCDATE)
60	Student instance FTE (STULOAD)
61	Foundation degree to degree bridging course (BRIDGE)
62	Department of Health funding body (DHFUND)
63	Initiatives (INITIATIVES)
6SF	Full time students
61	FTE method (FTEMETHOD)
62	FTE in year A (LOADYRA)
63	FTE in year B (LOADYRB)
64	Expected length of study (SLENGTH)
65	Units of length (UNITLGTH)
66	End date of instance (ENDDATE)
67	Reason for ending instance (RSNEND)
68	Good standing marker (PROGRESS)
69	Fee eligibility (FEEELIG)
70	Special fee indicator (SPECFEE)
71	Major source of tuition fees (MSTUFEE)
72	Level applicable to funding council HESES (FUNDEV)
73	Fundability code (FUNDPCODE)
74	Year of student on this instance (YEARSTU)
75	Year of course (YEARPRG)
76	Length of current year of instance (YEARLGTH)
77	Type of instance year (TYPEYR)
78	Completion of year of instance (FUNDCOMP)
79	Location of study (LOCSDY)

80	SLDD-discrete provision (ST13)
81	Exchange programmes (EXCHANGE)
82	ITT schemes (ITTCHMS)
83	PhD submission date (PHDSUB)
84	Franchised out arrangements (FROUTARR)
85	Franchise partner (FRANPART)
86	Disabled Student Allowance (DISALL)
87	FE student marker (FESTUMK)
88	Teacher Reference Number (TREFNO)
89	Completion status (CSTAT)
90	Destination of outward credit mobile students (DESTOCM)
91	Amount of tuition fees received/expected for the student (RECFEE)
92	Reason for partial or full non-payment of tuition fees (NONPAY)
93	Guided learning hours (GLHRS)
94	Suspension of active studies (NOTACT)
95	Destination (DESTIN)
96	Regulatory body reference number (DHREGREF)
97	NHS employer (NHSEMP)
98	Eligibility for enhanced funding (ELIGENFD)
99	Additional support cost (ADDSUPCT)
100	Learning difficulty (LEARNDIF)
101	Implied rate of council partial funding (IMPRATE)
102	Government initiatives (GOVINIT)
103	Number of units completed (NUMUNITS)
104	Number of units to achieve full qualification (NOUNTACH)
105	Eligibility for disadvantage uplift (ELIDISUP)
106	Disadvantage uplift factor (DISUPFAC)
107	Employer role (EMPROLE)
108	Qualified Teacher Status (QTS)
109	Student Support Number (SSN)
110	Gross fee (GROSSFEE)
111	Fee regime indicator (FEEREGIME)
112	Net fee (NETFEE)

7SF

Entry Profile

113	Domicile (DOMICILE)
114	Postcode (POSTCODE)
115	Highest qualification on entry (QUALENT2)
116	Highest qualification on entry (QUALENT3)
117	UCAS Application Number (UCASAPPID)
118	Parental education (PARED)
119	Dependents on entry (NIDPEND)
120	Marital status (MARSTAT)
121	Religion (RELIGION)
122	Socio-economic classification (SEC)
123	Occupation code (SOC2000)
124	Year left last institution (YRLINST)

125	Last institution attended (PREVINST)
126	Articulation (ARTICLN)
127	Access programmes (ACCESS)
128	New entrant to higher education (NEWENT)
129	PGCE subject of undergraduate degree (PGCESBJ)
130	PGCE class of undergraduate degree (PGCECLSS)
131	Welsh Baccalaureate Advanced Diploma (WELBACC)
8SF	Qualifications on Entry
132	Qualification type (QUALTYPE)
133	Qualification subject (QUALSBJ)
134	Qualification grade (QUALGRADE)
135	Qualification year (QUALYEAR)
136	Qualification sitting (QUALSIT)
9SF	Qualifications awarded
137	Qualification awarded (QUAL)
138	Classification (CLASS)
139	Outcome of ITT instance (OUTCOME)
140	Teaching qualification gained sector (TQGSEC)
141	Teaching qualification gained subject (TQGSUB)
10SF	Student on module
142	Module identifier (MODID)
143	Module status (MODSTAT)
144	Module outcome (MODOUT)
145	Module year (MODYR)
11SF	RAE data
146	RAE unit of assessment (UOA2008)
147	Unit of assessment percentage (UOAPCNT)
148	ITT phase/scope (ITTPHSC)
149	Foundation degree to degree bridging course (BRIDGE)
150	Department of Health funding body (DHFUND)
151	Initiatives (INITIATIVES)

Appendix 20.1 *HESA report project scope*

A. Project Potential Benefits

- This will enable Planning Office to be proactive about the data and issues related to the data;
- Planning Office and Faculties can then use this information to seek better understanding of why data is changed, and to enforce the requirement for certain data to remain static during the reporting process;
- Reduce reliance on faculty to provide amended information;
- Reduce the time taken by the faculty to provide information;
- Reduce communication issue between Faculty and Planning Office;
- Designing a single point of truth within UNIVERSE;
- Holding trackable data;
- Control over the fields and mainly 42% of fields which commonly get changed

Nevertheless, the potential benefit had been recognised to be much wider than only accurate HESA report. I.e. the benefit covers all the reports been produced from Student Record data held in UNIVERSE (internally or externally) by Planning Office. For instance the area of reports can be mentioned as HEFCE, League Tables, Students Number, and Surveys.

The benefit spread within faculties across the university.

B. Project Scope

Change report on student-related data, which Planning Office is reporting to national government e.g. Higher Education Statics Agency, HESA.

In total there are 151 subfields (11 fields) which Planning Office requires to report on;

- Course (with 12 sub-field)
- Course Subject (with 3 sub-field)
- Module (with 13 sub-field)
- Student (with 21 sub-field)
- Instance (with 14sub-field)
- Full time student (with 52sub-field)
- Entry Profile (with 19sub-field)
- Qualification on Entry (with 5-subfield)
- Qualification on Awarded (with 5-subfield)
- Student on module (with 4sub-field)
- REA data (with 3sub-field)

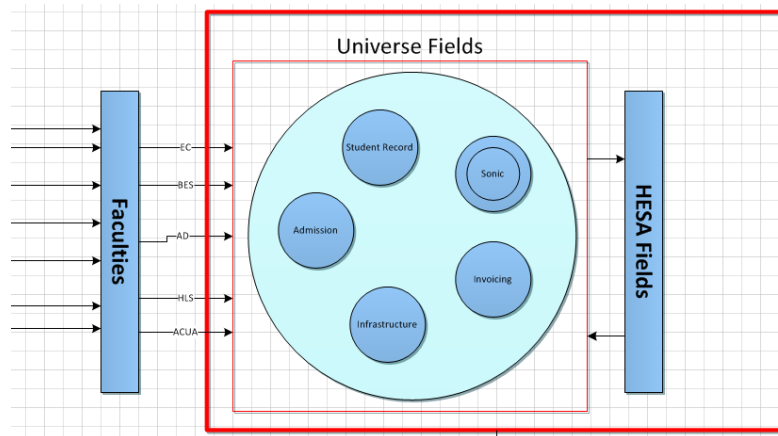


Figure1. DATA INPUT FLOW

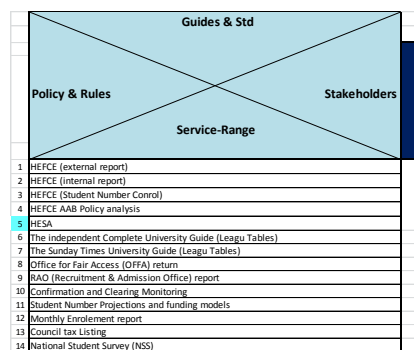
The fields are either directly mapped from UNIVERSE or they get fed from different tables. For instance, the Course identifier (COURSEID) information gets fed through 'course' table, (crscd) field, but 'reason for ending instance' (ENDDATE) gets calculated through other fields within the table.

The scope of the project is to investigate a way for better communication regarding the update on changes.

Appendix 20.2 *HESA report project VOS-model implementation*

– Stage 1-Service Range

A key part of the Planning Office’s activities is the reporting of student-related data to organisations within the national government. One such organisation is the Higher Education Statistics Agency, HESA. It has been decided by the management team that the area require attention for improvement is the report PO is producing from the “Student record” as it does have a direct impact on getting fund, data published for academic researcher, students, prospective students, private companies, professional bodies and the press and media. The service range provided by PO within the “Student record” area is collected based on the meeting with Principal Planning Officer.



The service included all the reports been produced by PO for either internal or external purpose.

– Stage 2-Selection of the Service

The selection of the service which requires the most attention between the range of services provided by PO on Student Record done by using Boston Matrix.

The Boston Matrix is rated the services based on the time and effort taken PO to produce reports comparing with the effort required to improve the current circumstance, and the effect the improvement in saving time and increasing efficiency can have in each case.

“HESA” report and “Confirmation and Clearing Monitoring” being selected as low effort which the solution can have high impact for the business based on the current situation. Between these two services because of the time period the project was running and the over projecting the project delivery, HESA has been selected for improvement.



– **Stage 3**-Classification and representation of the Stakeholders

As the PO is the Service Provide (SP) for the service, the stakeholders gathered and listed by their direct consultation. The gathered data build up the matrix of Service range vs. Stakeholders. The matrix holds information about the service provided by PO and the stakeholders with different level of involvement and power.

Based on VOS-model stakeholder category classification, the stakeholders have been classified;

- D. SP (Service Provider);- Planning Office (PO)
- E. Service Receiver (SR);- HESA
- F. Affected/Interested Stakeholder (AIS);- Vice-Chancellor group (VC), Senior Management, HLS Faculty, AD Faculty, BES Faculty, ACCUA, National/International Students, Audit Committee and Standing committee of chairs, Academic, Registry, IO, IT, HR-Academic program coordinator.

PO is selected as SP because they are the service owner and responsible for providing the ultimate service to the Service Receiver, as well as the one who decides about the changes to be made. HESA been appointed as Service Receiver (SR) or ultimate customer, as they are the one who approve the HESA report, i.e. if they are not satisfied they ultimate service will not be accepted and need reworking. In this case as the service needs to fit in the regulation has been set by HESA.

The Service HESA report															
Vice-Chancellor group	Senior Management	HESA	HLS Faculty	AD Faculty	BES Faculty	EC Faculty	ACUA	Planning Office	National/International Students	Audit committee and standing committee of chairs	Academic	Registry	IO	IT	HR-Academic program coordinator
AIS	AIS	SR	AIS	AIS	AIS	AIS	AIS	SP	AIS	AIS	AIS	AIS	AIS	AIS	AIS

– **Stage 4**-Listing the expected attributes by each stakeholder from the Service

This stage of the Model works on developing what is desired from the Service by each stakeholder. The attributes had been collected by one-to-one meeting. The meeting started with a short description, followed to the email sent out already to all stakeholders, on giving an introduction to the project and its aim.



Gazelleh Moradi
Fri 10/01/2014 15:43

mark as unread

To: Gill Child;

Hi Gill,

The project has been raised based on the requirements Planning Office have for reporting on changes made to the student records after the lock-down period. As the Planning Office rely on faculty to flag records which have been amended, sometimes this information is not passed by faculties or is flagged very late. This causes issues in the quality of data that Planning Office has to provide for internal/external reports, e.g. HESA. As a result Planning Office has to amend the records and then go through the quality checks again and resubmit the data.

To facilitate this we are working on an improvement project. As you are stakeholder within this process, it is helpful to know what would be your expectation and whether you will gain any benefit on increasing awareness of changes.

Would you let me know whether you are available on Wed 15th, Thursday 16th or Friday 17th, for a short meeting going over the process and the expectation/benefit with you?

With very kind regards,

Gazelleh Moradi
Assistant Business Analyst, Programme Management Team ITS
Doctoral Researcher - Engineering and Computing Faculty
Coventry University
aa5415@coventry.ac.uk
0755 742 5108

The meetings within Faculties were all set with Faculty Registrars who were point of contact between Faculties and PO. The standard set of question was designed in order to understand their input while asking about their expectation;-

- a. What is the process of informing PO in place from your faculty? How do you inform them? How do you get informed by staff on changes made?
- b. Why do changes happen?
- c. Why the information is passed late or not passed at all in some cases?
- d. What are your expectations to facilitate the process for better ultimate service to HESA?

Based on replies, the expectations were listed against Stakeholder classification. Collecting the expectation helped to build up details from different stakeholder perspective to identify value-drivers.

The green box in the matrix indicates the expected attributes by the specific stakeholders who had specified them, in cases where attributes are in interest of multi-stakeholders the boxes been shown by blue. This is when stakeholders are aligned, for instance attribute A1 which been in interest of AIS (Affected/Interested stakeholders), SR (Service Receiver), and SP (Service Provider).

Attribute A1, is specified by the Vice-Chancellor as "Quality, reliable data" for HESA reports from PO. A1 is in interest of senior management, HESA, EC faculty, Academic and PO as well. Having a similar expectation demonstrates the specified stakeholders involved in delivering the service have the same aim as Service Provider, and they are all expected to work toward the same purpose.

Attribute B1, is specified by Senior Management as "Quality, reliable data", which is the same expectation VC had. The difference between the green box and blue box is, the green one is specified by the stakeholder, the blue ones are the one which has been asked the stakeholder whether they have interest for them.

Attribute C1, is provided by HESA as “Reliable data for processing and providing information to UK government and HE funding bodies”. The attribute is specified clearly in set regulation by HESA.

Attribute D1, is provided by the HLS faculty registrar, as “Something tangible which we can analysis the changes made on data to reduce the changes”. As currently there is no way to track back the changes, it is not possible to analysis the reason, when, and by whom the changes being made. Have they been authorised? Is there any trend on changes? Having a required data in place would help to reduce any non-required variation in the process.

Attribute D2, is provided by the HLS faculty registrar, as “A facility to track the changes to know why changes being made”.

Attribute D3, is provided by HLS faculty registrars, as “The report on changes including reason, and who authorised the changes”.

Attributes E1, and E2 are specified by Art and Design Faculty registrar, as “A report which clearly indicates changes from A to B”, and “Planning office to clearly define fields which need to be communicated on changes made”. E1 mentioned as staff within the faculty amend student records, and especially during the peak time (registration) not all changes get communicated. Therefore faculty registrars are not able to communicate all the changes made to the records. E2, mentioned as not being sure exactly what fields within UNIVERSE get reported to HESA so that any amendment get reported against them.

Attribute G1, “A report which indicates the changes from A to B”, G2, “Option to filter within the report for relevant fields”, and G3, “Provide a better understanding of instance for faculty registrars” mentioned by Engineering and Computing (EC) faculty registrars.

Attribute H1, “Planning Office to clearly define which fields we are allowed to change without confirmation”, H2, “Eliminate human errors on not reporting cases”, and H3, “A system in place to hold information regarding changes to review changes annually”, mentioned by ACUA.

Planning Office (PO) has expectations as I1, “Notify us on all the changes made on UNIVERSE fields which gets reported to HESA”, and I2, “Current accurate communication on all the changes and updates”.

National and International students requested attributes as J1, “Flexibility to apply for request on changing module, courses” as well as J2, “Keeping accurate data on my student record”.

Audit committee mentioned K1 attribute as “Providing accurate data” as their main expectation.

Academic mentioned L1 “Flexibility to update any changes within academic year”, and L2 “Allow to change courses offered within the academic year”.

IT raised the point for O1 “Auditing system which UNIVERSE can accommodate”, while HR-Academic program coordinator mentioned P1 “A communication system which can accommodate the changes because of the nature of courses we offer”.

Business Faculty (BES), Registry and IO didn’t reply the request for a meeting, to make sure they are happy with the decision made, later in the project an email being sent out with a deadline to reply if they are not happy about the solution for improvement. The issue of stakeholder involvement has been discussed in more depth in Chapter 8-Discussion.

Guides & Std		The Service													
		HESA report													
		Vice-Chancellor group	Senior Management	HESA	HLS Faculty	AD Faculty	BES Faculty	EC Faculty	ACUA	Planning Office	National/International Students	Audit committee and standing committee of chairs	Academic	Registry	IO
Policy & Rules	Stakeholders	AIS	AIS	SR	AIS	AIS	AIS	AIS	AIS	SP	AIS	AIS	AIS	AIS	AIS
A1 Quality, reliable data	Vice-Chancellor														
B1 Quality, reliable data	Senior Management														
C1 Reliable data for processing and providing information to UK government and HE funding bodies	HESA														
D1 Sit tangible which we can analyse the changes made on data to reduce the changes	HLS														
D2 A facility to track the changes to know why changes been made															
D3 The report on changes including reason, and who authorised the changes															
E1 A report which clearly indicates changes from A to B	AD														
F2 Planning office to clearly define fields which need to be communicated on changes made															
F3	BES														
F4															
G1 A report which indicates the changes from A to B	EC														
G2 Option to filter within the report for relevant fields															
G3 Provide a better understanding of instance for faculty registrars															
H1 Planning office to clearly define which fields we are allowed to change without confirmation	ACUA														
H2 Eliminate human error on not reporting cases															
H3 a system in place to hold information regarding changes to review changes annually															
I1 Notify us on all the changes made on UNIVERSE fields which gets reported to HESA	Planning Office														
I2 Current accurate communication on all the changes and updates															
J1 Flexibility to apply for request on changing module, course	N&I International Student														
J2 Keeping accurate data on my student record															
K1 Providing accurate data	Audit committee														
L1 Flexibility to update any changes within the academic year	Academic														
L2 Allow to change courses offered within the academic year															
M1	Registry														
M2															
N1	IO														
N2															
O1 Auditing system which UNIVERSE can accommodate	IT														
P1 A communication system which can accommodate the changes because of the nature of courses we offer	HR														

- **Stage 5-** Narrow down the attributes of each stakeholders to the one with highest impact on the service

[illegible]

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– **Stage 6-** Trade-off between Business Performance and VOS

	VOS	Stakeholders	
A1	Quality, reliable data	AIS,SR,SP	Fundamental
C1	Reliable data for processing and providing information to UK government and HE funding bodies	AIS,SR	
K1	Providing accurate data	AIS,SR	
E1	A report which clearly indicates changes from A to B	AIS	
I1	Notify us on all the changes made on UNIVERSE fields which gets reported to HESA	SP	
O1	Auditing system which UNIVERSE can accommodate	AIS	More is better
D3	The report on changes including reason, and who authorised the changes	AIS	
E2	Planning office to clearly define fields which need to be communicated on changes made	AIS	
H3	a system in place to hold information regarding changes to review changes annually	AIS/SR	
G3	Provide a better understanding of instance for faculty registrars	AIS	Delighter
J1	Flexibility to apply for request on changing module, course	AIS	
L2	Allow to change courses offered within the academic year	AIS	
P1	A communication system which can accommodate the changes because of the nature of courses we offer	AIS	

– **Stage 7-** VOS to Value-drivers

						Value-Driver	
A1	VOS	Quality, reliable data	Issue	the changes on student record is not track able/communicated	Requirements	Auditing system in place on required fields	Auditing system which produce a report to track changes by stakeholders, to maintain the data quality and reliability
C1	VOS	Reliable data for processing and providing information to UK government and HE funding bodies	Issue	Changes made on Student records within faculties, does not get reported to Planning Office	Requirements	Being sure the data held and reporting against the accurate and most current	Holding the most current data including all the changes, to be able to provide reliable reports to UK Government and HE funding bodies
K1	VOS	Providing accurate data	Issue	there is no checking on whether the changes made are authorised, accurate, or contains human errors	Requirements	Auditing system in place to review the changes made on fields which gets reported by PO	Auditing system on reporting fields to review the changes, for providing accurate data
E1	VOS	A report which clearly indicates changes from A to B	Issue	loosing track of data been changed	Requirements	A reporting facility which indicates the required information regarding the changes made	Extracted report from auditing sys to include the changes from A to B to make it trackable
I1	VOS	Notify us on all the changes made on UNIVERSE fields which gets reported to HESA	Issue	Changes made on Student records within faculties, does not get reported to Planning Office	Requirements	making system intelligent enough to audit the changes, rather than only relaying on staff (as the student record can be huge and missing changes to be reported can be inevitable)	improve the capability of UNIVERSE to notify all changes made on fields which gets reported to HESA to increase the integrity of data and PO awareness of changes
O1	VOS	Auditing system which UNIVERSE can accommodate	Issue	The current auditing mechanism within UNIVERSE is unreliable, difficult to report on, is not readily extensible, dependent on how changes are made, is inconsistent	Requirements	record data changes in audit tables which are replicas of those source data table with additional change information appended.	Standard approach to data auditing on UNIVERSE
D3	VOS	The report on changes including reason, and who authorised the changes	Issue	Currently there is no control over who and why the changes been made, no back tracking is possible	Requirements	A reporting facility which indicates the required information regarding the changes made	Extracted report from auditing sys to include the reason, and who authorised the changes
E2	VOS	Planning office to clearly define fields which need to be communicated on changes made	Issue	Not knowing which fields within UNIVERSE require reporting as a change from Faculties to PO	Requirements	List of fields to be sent to Faculties to specifies the changes need to communicated against	Communication between the PO and Faculty Registrars on specific fields which needs reporting
H3	VOS	a system in place to hold information regarding changes to review changes annually	Issue	Changes can't be track back currently, therefore analysing the occurrence is not possible	Requirements	Reports which can be saved as history, and can be tracked back for analysing the trend of changes	Enabling the audit data relating to any given table and period of time to be retrieved in a fixed format to be reviewed
G3	VOS	Provide a better understanding of instance for faculty registrars	Issue	Changes within faculties is not always communicated	Requirements	Communication within the faculties need to be improved	The Faculty registrars to have access to the mechanism to be alerted on changes they are interested in seeing/being notified of
J1	VOS	Flexibility to apply for request on changing module, course	Issue	because of the variety it is been offered for the courses to students, it is required to be flexible on applying changes	Requirements	No time limit on requesting/applying changes to the fields	system capable of monitoring and controlling the student record as and when changes applied, to offer the required flexibility for users
L2	VOS	Allow to change courses offered within the academic year	Issue	There is a lock down time when no more changes allowed by PO, in order to have a more control over changes	Requirements	No time limit on requesting/applying changes to the fields	system capable of monitoring and controlling the student record as and when changes applied, to offer the required flexibility for users

Appendix 21 *Introduction to the 24/7 IT Service support*

A. Project Scope

Only out of hours ITS support provision for members of staff, not students, was the focus of this investigation.

B. Current IT support setup

The support we are providing from IT in high level can be divided to;

1. **Sustainability control** on making sure the systems are running, e.g. Emails, Storage, Staff portal. This requires a 24/7 control and tracking in place.
2. **The issues** which can be raised by staff through the available routes.

The sustainability of the systems in place can be covered through the methods of testing prior to implementation, as well as the process in place for dealing with any failure within 24/7. Currently the alert system is in place, but out of working hours, for instance regarding the UNIVERSE, there is no-one to deal with the issue.

The current approach to the issues been raised is reactive. One of the main reasons for having reactive approach to the issues is not having a system in place to track the data. As a management tool, SCSM is available and does offer the opportunity for further required analysis, however it hasn't been configured for the team.

In result the 24/7 project can be reviewed from two aspects;

- Sustainability control on systems and Technical/ hosting aspects; the technical aspect is divided into two areas of In-house and Overseas Partner and as this project is mainly an overview of the 24/7 requirement, the overseas partners' Technical requirement been mainly overviewed, rather than the in-house requirement for the reliability plan.
- Resource planning for resolving issues; Based on the academic timeline the peak-time been highlighted for both in-house and international partners

The overseas partners are related to two main areas within the University IO and APU.

- Delhi is a back-office of IO, processing and entering data while they send admission to accepted international applicant. However, the enrolment happens within the UK. Currently, Delhi has got 14 members which are planned to be increased to 18. China and Nigeria have read only access to UNIVERSE, and access to staff portal only for information. Therefore, from IO perspective Delhi office requirement been investigated further.
- The systems provided by Coventry University are in use for both APU partners as well as APU staff travelling around the world selling Coventry University subjects.

- Nevertheless, APU partners simply have read only access to UNIVESE. Currently the overseas partnership is spread between 16 countries around the world. Coventry University APU validates their certificate as well as reviews the quality of their work. APU students have access to SOLAR, and in case of any issue the partners will contact APU staff in the UK. New training pack for SOLAR been designed for students. The list of partner been included in Appendix 3, however, as they only have read only access they haven't been included in the report in more details.
- APU staffs (13academic partnership manager and 35 course advisors) have access to all the systems in use in the house. They use remote desktop to access the system like UNIVERSE, SAB/PAB, and L drive.

Sustainability control and Technical aspect

The in-house sustainability control is designed to be monitored and actioned during the UK working hours any problem out of working hours will be sent as an alert to the team and will be dealt with in next working day.

Technical aspect; Delhi has a huge problem regarding the speed performance. The problem has made frequent issues such as;

- Long delay on using remote desktop
- Losing remote desktop connection
- Long delay on merging the template letter between L-drive to UNIVERSE
- Have to attempt to login to remote desktop several times
- Every simple changes within UNIVERSE or L-drive such as Drag, Delete is with delay

The issues reduce the efficiency, especially during July-August-Sep-Oct, period when they deal with 100 offers per day potentially.

Resource planning for resolving issues

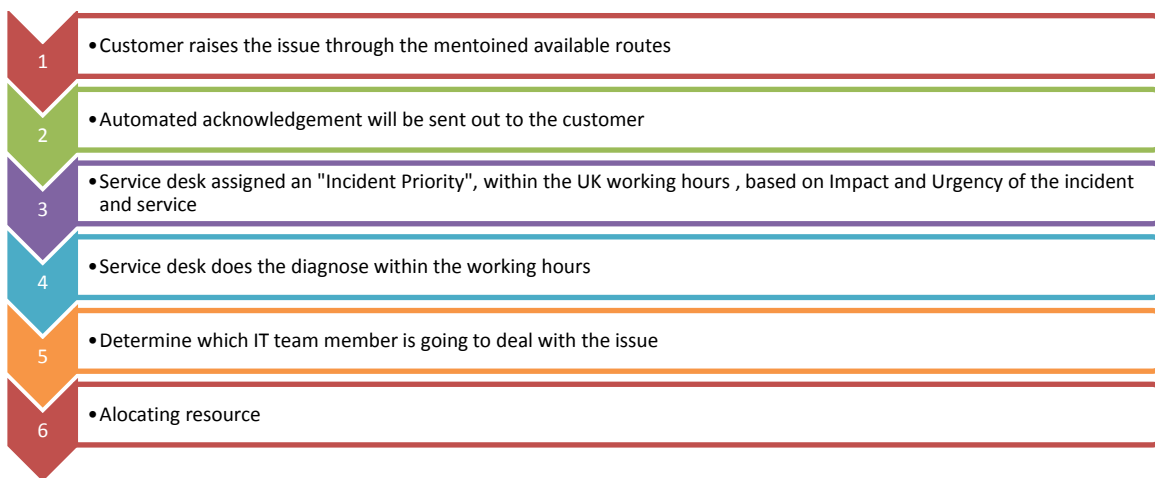
There are various methods in which a member of staff can report a problem:

- By accessing the self-service portal either by LogMyCall on the desktop or by visiting itsupport.coventry.ac.uk (only for staff)
- By emailing itsupport@coventry.ac.uk
- By telephone on 0247 688 7777 or just by 7777 if on campus.
- Or by making a personal visit to the service desk in the Library (this service is mainly used by students)

Other ways of getting support information are via

- FELIX (Firstline Enduser Local Information Xchange)
- Kiosks and information screens across campus providing information on ITS facilities
- Student portal IT Service page
- Staff portal IT Service page

However, interviewing the overseas partners raised additional method in use for reporting a problem;-e.g. India they email Head of Admission in IO, and the other 30 partners around the world they email APU, and then IO or APU takes it forward with IT either through email or phone call.



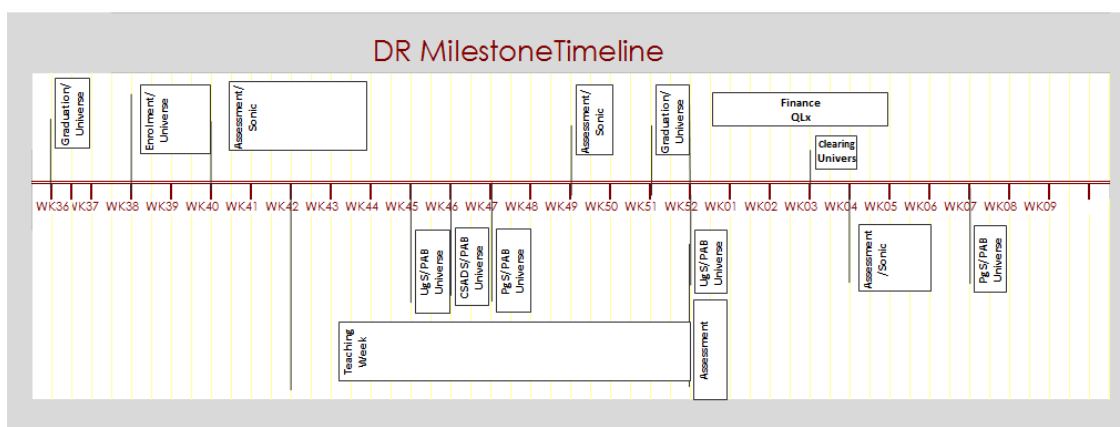
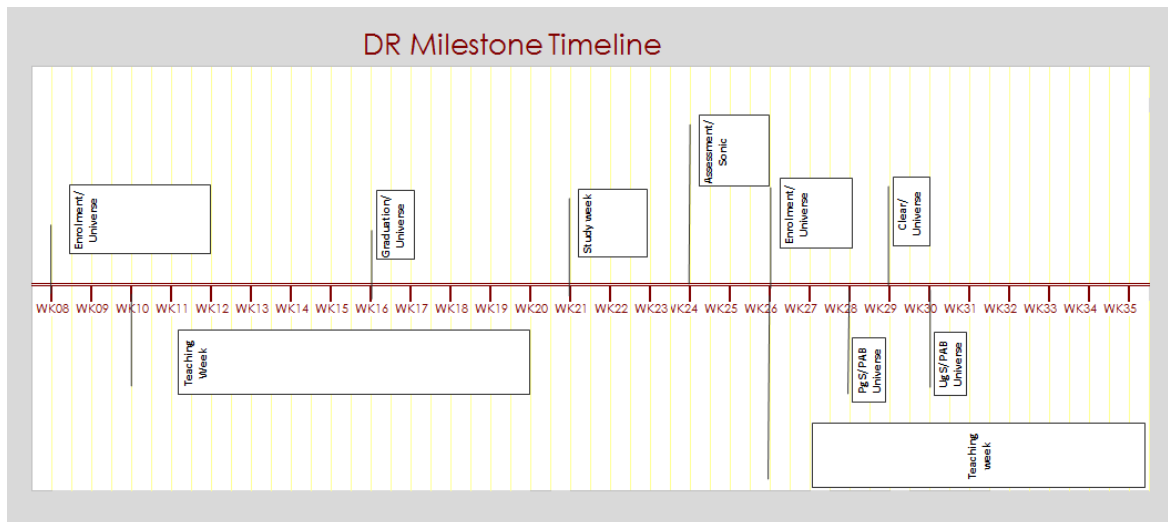
Based on the departmental service level agreement the service level been agreed, and in result the incidents and service requests get assigned against to bellow priorities;

1. Priority 1; Immediate response is required-target is to deliver a solution within 30min or less
2. Priority 2; Immediate response is required –target is to deliver solutions within 4hours or less
3. Priority 3; Target to deliver a solution within 2days or less
4. Priority 4; Target to deliver solution within 5 days or less
5. Priority 5; Target to deliver solution within 25 days or less
6. Priority 6; Target to provide fix in the next major release or upgrade

The review of the 'Service Request prioritise' highlighted the issues;

- It is more opinion based rather business need reflecting the academic timeline, i.e. there is a trend in systems usage depending on academic calendar which is not been taken to an account
- Based on service level agreement if the request falls between the priorities 3 to 6, regardless of the time difference between UK and overseas the 24/7 service should not be expected. However, this prioritisation is not communicated with the customer currently therefore from their point of view waiting time is vague.

The university goes through different millstone within the academic timeline, i.e. Clearing, Enrolment, Autumn semester, Autumn exam, Spring semester, Spring exams, Summer semester, and Resit exam;



Based on the milestones, the criticality of the system availability can. The review of the disaster recovery analysis for core systems in use in-house highlighted the period when the system is required by staff;

	Sep	Oct	Nov	Dec	Jan	Feb	March	April	May	Jun	July	August	Sep
Core Services	WK08	WK10	WK11	WK12	WK13	WK14	WK15	WK16	WK17	WK18	WK19	WK20	WK21
CHRIS													
CMIS													
CURVE													
CU2Work													
CU2Study													
Email													
Microsoft Office													
QLx & QLF (ABW)													
Raiser's Edge													
RoomService													
SCSM													
Staff Portal													
Student portal													
Storage													
Paybase													
Salaries													
Supplies													
DDM													
Universe ;													
SOLAR													
SONIC													
NOVA													
Tier4 checkin sys													
Payment path way													
Filestream													
Corporate planner													
OMIS													
Event force													

- Delhi uses 'UNIVERSE', 'Outlook', and 'L-drive' through remote desktop;

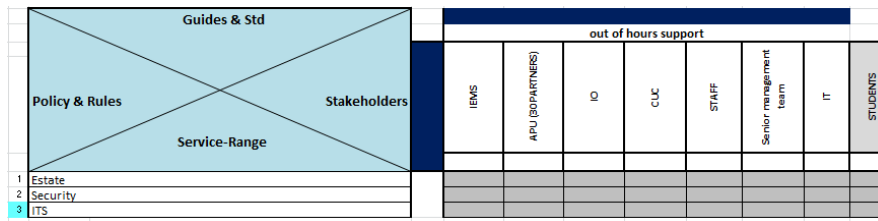
	Sep	Oct	Nov	Dec	Jan	Feb	March	April	May	Jun	July	August	Sep												
Core Services	WK08	WK11	WK14	WK17	WK20	WK23	WK26	WK29	WK32	WK35	WK38	WK41	WK44	WK47	WK50	WK53	WK56	WK59	WK62	WK65	WK68	WK71	WK74	WK77	WK80
	WK09	WK12	WK15	WK18	WK21	WK24	WK27	WK30	WK33	WK36	WK39	WK42	WK45	WK48	WK51	WK54	WK57	WK60	WK63	WK66	WK69	WK72	WK75	WK78	WK81
	WK10	WK13	WK16	WK19	WK22	WK25	WK28	WK31	WK34	WK37	WK40	WK43	WK46	WK49	WK52	WK55	WK58	WK61	WK64	WK67	WK70	WK73	WK76	WK79	WK82
	WK11	WK14	WK17	WK20	WK23	WK26	WK29	WK32	WK35	WK38	WK41	WK44	WK47	WK50	WK53	WK56	WK59	WK62	WK65	WK68	WK71	WK74	WK77	WK80	WK83
	WK12	WK15	WK18	WK21	WK24	WK27	WK30	WK33	WK36	WK39	WK42	WK45	WK48	WK51	WK54	WK57	WK60	WK63	WK66	WK69	WK72	WK75	WK78	WK81	WK84
CU2Work																									
Email																									
Microsoft Office																									
Storage																									
Universe ;																									

They are 5:30 hours ahead of the UK and their public holiday differ from us. Therefore, their working hours at London time will be 3:30 am to 11:30 am. July- August-September and October is a critical duration for them, which they require their core system up and running.

- Regarding the APU staff, they use 'L-drive', 'UNIVERSE', and 'Outlook' through remote desktop. For contacting partners they mainly use Email and Skype. As the enrolment date varies the period which can be critical for them to have access to UNIVERSE for SAB/PAB varies as well, on the other hand, because the staff travel to different countries around the world it is difficult to pin down specific period of time in which the support might be required. Saying that, it has been mentioned that as long as the core systems work properly, for any other odd issues they can wait to be dealt with in UK working hours.

Appendix 21.1 24/7 IT Service support VOS-model implementation

– **Stage 1-Service Range**



– **Stage 2-Selection of the Service**

With more overseas partnership's, campuses and office's being planned, one of the major challenges ITS will face will be to provide IT Support outside of 'normal' UK working hours.

Therefore, the review of current IT service has been selected within the service-range by the senior manager to be reflected in developing a new strategy.

– **Stage 3- Stakeholder representation and classification**

The Service						
ITS 24/7 Support						
IEMS	APU	IO	CUC	STAFF	IT	Senior management
SR	SR	SR	AIS	SR	SP	AIS

In stage 3, students have been left out as the scope of project only covered the staffs.

- IEMS (International Experience and Mobility Service) got selected as SR
- APU (Academic Partnership Unit) as SR
- IO (International Office) as SR
- CUC (Coventry University College) as AIS
- Staffs as SR
- IT as SP
- Senior managements as AIS

– **Stage 4-Listing the expected attributes by each stakeholder from the Service**

Guides & Std		The Service						
		ITS 24/7 Support						
		IBMS	APU	IO	CUC	STAFF	IT	Senior management
Policy & Rules		SR	SR	SR	AIS	SR	SP	AIS
Stakeholders								
Service-Attribute								
A1	Training and awareness of the current system in place	IEMS						
B1	Access to email in overseas offices (i.e. China, Nigeria, India,...)							
B2	Accessible Follow me printer via the remote desktop facility							
B3	Core systems be reliable while we can wait for odd issues to be solved in UK working hours							
B4	extend password expiration period for partners in using UNIVERSE							
C1	Improvement on local infrastructure (network, server)							
C2	increase L drive space							
C3	Improve connection speed							
C4	Training on UNIVERSE							
D1	Deal with issues around UNIVERSE							
E1	ITS prioritisation to reflect academic milestones							
E2	Remove multiple support initiatives and offer a single stop support number							
F1	Implementing management information report system in incident management system							
F2	Contingency plan for core systems out of hours failure							
F3	Visibility on raised issues trend							
G1	Improving ITS quality of service							
G2	provide IT Support outside of 'normal' UK working hours							

Within this stage, the stage 4.1 is covered as well and the shared interest got highlighted.

- **Stage 5-** Narrow down the attributes of each stakeholders to the one with highest impact on the service

A1	Training and awareness of the current system in place	IEMS	
B1	Access to email in overseas offices (i.e. China, Nigeria, India,...)		5
B2	Accessible Follow me printer via the remote desktop facility		2
B3	Core systems be reliable while we can wait for odd issues to be solved in UK working hours		5
B4	extend password expiration period for partners in using UNIVERSE		3
C1	Improvement on local infrastructure (network, server)		5
C2	increase L drive space		4
C3	Improve connection speed		3
C4	Training on UNIVERSE		3
B3	Core systems be reliable while we can wait for odd issues to be solved in UK working hours		5
D1	Deal with issues around UNIVERSE	CUC	
E1	ITS prioritisation to reflect academic milestones		5
E2	Remove multiple support initiatives and offer a single stop support number		5
A1	Training and awareness of the current system in place		3
B2	Accessible Follow me printer via the remote desktop facility		2
C2	increase L drive space		4
F1	Implementing management information report system in incident management system		5
F2	Contingency plan for core systems out of hours failure		4
F3	Visibility on raised issues trend		5
G1	Improving ITS quality of service		5
G2	provide IT Support outside of 'normal' UK working hours	Senior management	5

The VOS got selected by stakeholders by using the weighting method.

VOS		Stakeholders
A1	Training and awareness of the current system in place	SR
B1	Access to email in overseas offices (i.e. China, Nigeria, India,...)	SR
B3	Core systems be reliable while we can wait for odd issues to be solved in UK working hours	SR
C1	Improvement on local infrastructure (network, server)	SR
D1	Deal with issues around UNIVERSE	AIS
E1	ITS prioritisation to reflect academic milestones	SR
E2	Remove multiple support initiatives and offer a single stop support number	SR
F1	implementing management information report system in incident management system	SP
F3	Visibility on raised issues trend	SP
G1	Improving ITS quality of service	AIS
G2	provide IT Support outside of 'normal' UK working hours	AIS

– **Stage 6-** Trade-off Business Performance VS. VOS

The selected VOS got traded off with business performance priority;

	VOS	Stakeholders	
B1	Access to email in overseas offices (i.e. China, Nigeria, India,...)	SR	Fundamental
B3	Core systems be reliable while we can wait for odd issues to be solved in UK working hours	SR	
C1	Improvement on local infrastructure (network, server)	SR	
F1	implementing management information report system in incident management system	SP	
A1	Training and awareness of the current system in place	SR	More is better
D1	Deal with issues around UNIVERS	AIS	
E1	ITS prioritisation to reflect academic milestones	SR	
F3	Visibility on raised issues trend	SP	
G1	Improving ITS quality of service	AIS	Delighter
E2	Remove multiple support initiatives and offer a single stop support number	SR	
G2	provide IT Support outside of 'normal' UK working hours	AIS	

– **Stage 7-** VOS to Value-drivers

					Value-Driver
B1					
VOS	Access to email in overseas offices (i.e. China, Nigeria, India,...)	Issue	staff inbox reaching its capacity and not being able to receive email	Requirements	more storage space
					Offering overseas Office reliable access to emails by putting plan in place to resolve reoccurring issues
B3					
VOS	Core systems be reliable while we can wait for odd issues to be solved in UK working hours	Issue	can't effort a failure in core systems specially in peak time	Requirements	Tracking system in place to monitor the core systems performance
					High reliability for core systems performance by monitoring
C1					
VOS	Improvement on local infrastructure (network, server)	Issue	Problem on linking between L drive and remote- desktop, losing connection, low speed	Requirements	technical review of infrastructure is required
					Improvement on local infrastructure based on possibility offered by the country
F1					
VOS	implementing management information report system in incident management system	Issue	The current Incident Management system uses 2010 version of System Centre Service Manager (SCSM). The system was only setup for incident reporting while other modules of the system were planned for later phase. Due to the current configuration of the system, it is difficult to extract useful management information for analysis.	Requirements	Configuration of the new SCSM version with the report module
					implementing management information report system in incident management system, by configuration of the system in use
A1					
VOS	Training and awareness of the current system in place	Issue	Not having training to use collaborations tools such as Echo360, and not having awareness about Lync and its purpose	Requirements	training and communication
					Providing training and communication around systems and applications required by staff
D1					
VOS	Deal with issues around UNIVERS	Issue	UNIVERSE is one of the key systems for CUC	Requirements	* A dedicate local delivery technician is available to cover CUC on Saturday. A contract is in place with Bull to cover network support out of hours.
					A reliable UNIVERSE system
E1					
VOS	ITS prioritisation to reflect academic milestones	Issue	Prioritisation of the issues has been classified in general term	Requirements	taking to consideration the academic milestones
					ITS prioritisation aligned with academic milestones
F3					
VOS	Visibility on raised issues trend	Issue	Reactive approach to the issues	Requirements	management system available to track and analysis the issues and their trend
					Management system available for visibility on raised issues trend
G1					
VOS	Improving ITS quality of service	Issue	competition	Requirements	having right strategy in place
					Improving ITS quality of service by having right strategy in place

E2						
V O S	Remove multiple support initiatives and offer a single stop support number	Issue	There are multiple initiatives currently under way for various type of emergency support. Academics have to remember various emergency numbers to report issues related to the teaching support. Not having a one stop support number could potentially cause confusion for staff members and could cause issues such i.e. teaching time could be wasted in calling various support numbers in order to get the required support.	Requirements	considering only one support number for staff.	Single logging system for all support calls
G2						
V O S	provide IT Support outside of 'normal' UK working hours	Issue	more overseas partnership's, campuses and office's being planned	Requirements	to review the option of expanding IT support beyond 5:00 & better cover for overseas office	ITS support out of hours based on conituous reviews

Stage	Actual Output	Value-Drivers	Expected Output
IT Support	Reactive, un-tracked IT support within working hours	B1 Offering overseas Office reliable access to emails by putting plan in place to resolve reoccurring issues	Pro-active trackable IT Support, with highly reliable systems and infrastructure for all the overseas and UK offices
		B3 High reliability for core systems performance by monitoring	
		C1 Improvement on local infrastructure based on possibility offered by the country	
		F1 Implementing management information report system in incident management system, by configuration of the system in use	
		A1 Providing training and communication around systems and applications required by staff	
		D1 A reliable UNIVERSE system	
		E1 ITS prioritisation aligned with academic milestones	
		F3 Management system available for visibility on raised issues trend	
		G1 Improving ITS quality of service by having right strategy in place	
		E2 Single logging system for all support calls	
		G2 ITS support out of hours based on continous reviews	

Appendix 22 *Student information report improvement project*

A. As-Is current state of PC data quality

The current information flow can be divided in to 3 main categories;

- Data collection;- the systems in use are;
 - SOLAR; an interface where the students manually input their TT,H and C address during online enrolment for national student or post enrolment for international student;
 - iApply; supports 9 types of potential student applications ;
 - UCAS; is an external system for capturing student data and has the PC checker in place.
- Data processing and storage;- UNIVERSE holds the information from UCAS, iApply, and SOLAR.
- Data distribution;-data is transferred to systems such as RSN, QLx and used to generate HESA reports (toolkit) from UNIVERSE.

B. Methods in Use

The current data quality checking methods in use for Postcode are;

- PC checker in UCAS (external, only for home address, UK students);
- Old version of PC checker in SOLAR (TT address and Correspondence address);
- HESA toolkit; to validate the structural and logical rules in place from HESA;
- Manual search on UNIVERSE student profile & manual search on Event log in UNIVERSE;
- Google it!

In the event that the full TT-PC is not known, by rules in place by HESA, the Planning Office must return at least the outward part (e.g. CV1). The first part of the PC is essential for allowing HESA to do geographic analysis.

For students entering through UCAS, the information will be available from UCAS via the specific transaction. If no valid TT-PC (full or outward only) can be ascertained an empty element should be returned with reason for Null attributes set to 1 within the HESA report.

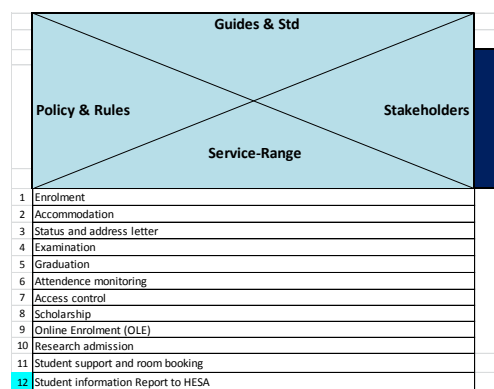
Appendix 22.1 *Student information report VOS-model implementation*

– **Stage 1**-Service Range

It's been raised to senior manager attention that student information held in the system plays an important role across the university. Therefore, a range of service university provides based on the student address information got listed.

– **Stage 2**-Selection of the Service

Between the service ranges, which are holding student address data within the University, for improvement Student information report to HESA service was selected. As HESA holds fixed and specific rules on student address information and all the student address information has to get checked and approved against it.



– **Stage 3**- Stakeholder representation and classification

For HESA report service, Planning Office selected as SP, and HESA as SR and the rest of stakeholders as AIS.

Service							
HESA Report							
IO	Registry/Faculty Registrar	Student	Tier4 Compliance	Finance	HESA	Planning office	Accommodation office
AIS	AIS	AIS	AIS	AIS	SR	SP	AIS

– **Stage 4**-Listing the expected attributes by each stakeholder from the Service

Face to face meetings was conducted to gather the expectation list. The assumption from project manager was quality data is what needs to be worked on as a solution prior to using the model. After gathering expectation, even though they were all aligned as expected, but the detailed given on expectation made the situation clearer for working forward.

<div> <div>Guides & Std</div> <div>Policy & Rules</div> <div>Stakeholders</div> <div>Service-Attribute</div> </div>		Service							
		HESA Report							
		IO	Registry/ Faculty Registrar	Student	Tier4 Compliance	Finance	HESA	Planning office	Accommodation office
		AIS	AIS	AIS	AIS	AIS	SR	SP	AIS
A1	Reliable quality data	IO							
B1	Accurate, right Correspondence address to send Research Student results letter after a PRP								
B2	Accurate, right Correspondence address to contact student in case they haven't enrolled in expected time								
B3	Accurate, right correspondence address for sending warning letter for lack of engagement (including Tier4 monitoring)								
B4	Correspondence address to send students their award letter and holding certificate before their Graduation								
B5	Correspondence address to send students not attending graduation, the degree certificate								
B6	Reliable PC information								
B7	Checking mechanism in place								
B8	Quality of information input by students need to be controlled as currently is really poor								
B9	Accurate address for send out final result, Forcible withdrawals and other official type of documentation								
B10	Control in place in case of chasing the student is required								
B11	Require a mechanism in place for checking and chasing students about their provided info								
C1	User -friendly system in place to facilitate the process of providing the personal contact information	Student							
D1	Up-to-date TT address	Tier4 Compliance							
E1	Reliable data	Finance							
F1	data approved by HESA toolkit, reflecting the HESA rules in place	HSEA							
G1	Reduce the manual amendment								
G2	Minimise the structural and logical errors								
G3	Improve Home and TT PC quality								
G4	Remove the manual PC search								
G5	Minimise the errors related to Home, TT, and Correspondence PC to improve data Quality								
G6	Remove the manual incorrect input PC								
H1	Sharing data with planning office reduce the report need to be written to planning office	Accommodation Office							

- **Stage 5-** Narrow down the attributes of each stakeholders to the one with highest impact on the service

The weighting method was used to quantify the expectations of the stakeholder, while selecting the ones with highest impact to the service from each stakeholder point of view;

A1	Reliable quality data	IO	5
B6	Reliable PC information		4
B1	Accurate, right Correspondence address to send Research Student results letter after a PRP	Registry/ Faculty Registrars	4
B2	Accurate, right Correspondence address to contact student in case they haven't enrolled in		5
B3	Accurate, right correspondence address for sending warning letter for lack of engagement (including		4
B4	Correspondence address to send students their award letter and holding certificate before their Graduation		4
B5	Correspondence address to send students not attending graduation, the degree certificate		5
B6	Reliable PC information		5
B7	Checking mechanism in place		5
B8	Quality of information input by students need to be controlled as currently is really poor		5
B9	Accurate address for send out final result, Forcible withdrawals and other official type of documentation		4
B10	Control in place in case of chasing the student is required		4
B11	Require a mechanism in place for checking and chasing students about their provided info		5
A1	Reliable quality data		5
A1	Reliable quality data	Student	4
C1	User -friendly system in place to facilitate the process of providing the personal contact information		5

D1	Up-to-date TT address	Tier4 Compliance	4
A1	Reliable quality data		5
B2	Accurate, right Correspondence address to contact student in case they haven't enrolled in expected time		5
B3	Accurate, right correspondence address for sending warning letter for lack of engagement (including Tier4 monitoring)		4
E1	Reliable data	Finance	4
A1	Reliable quality data		5
F1	data approved by HESA toolkit, reflecting the HESA rules in place	HSEA	5
A1	Reliable quality data		5
G1	Reduce the manual amendment	Planning office	5
G2	Minimise the structural and logical errors		5
G3	Improve Home and TT PC quality		5
G4	Remove the manual PC search		5
G5	Minimise the errors related to Home, TT, and Correspondence PC to improve data Quality		5
G6	Remove the manual incorrect input PC		5
F1	data approved by HESA toolkit, reflecting the HESA rules in place		5
B6	Reliable PC information		5
B7	Checking mechanism in place		5
A1	Reliable quality data		5
H1	Sharing data with planning office reduce the report need to be written to planning office	Accommodation Office	5

– **Stage 6- Trade-off between Business Performance and VOS**

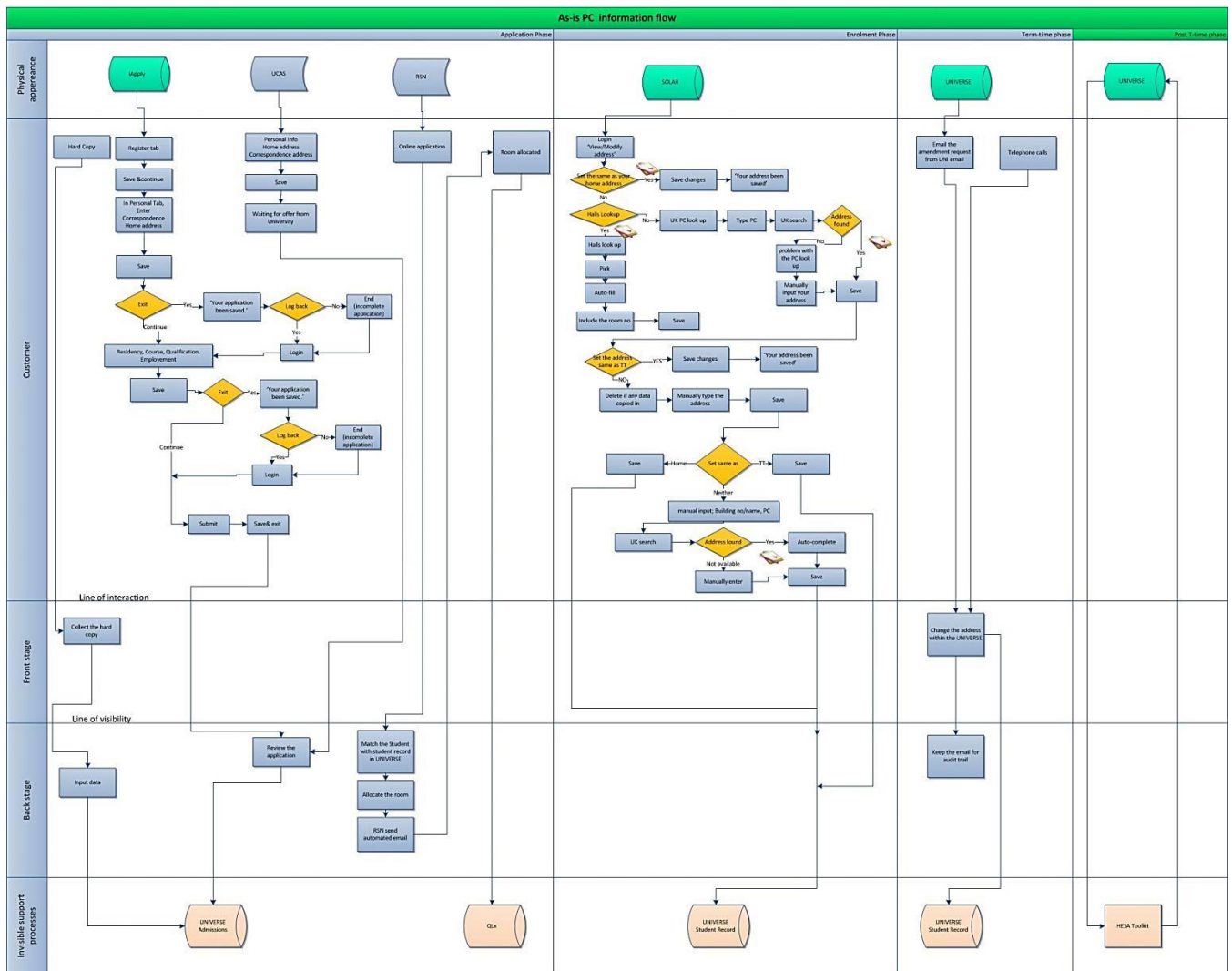
	VOS	Stakeholders	Delighters	More is better	Fundamental
A1	Reliable quality data	AIS, SR, SP			A1
B2	Accurate, right Correspondence address to contact student in case they haven't enrolled in	AIS		B2	
B5	Correspondence address to send students not attending graduation, the degree certificate	AIS		B5	
B6	Reliable PC information	AIS			B6
B7	Checking mechanism in place	AIS, SP		B7	
B8	Quality of information input by students need to be controlled as currently is really poor	AIS			B8
B11	Require a mechanism in place for checking and chasing students about their provided info	AIS	B11		
C1	User -friendly system in place to facilitate the process of providing the personal contact information	AIS		C1	
F1	data approved by HESA toolkit, reflecting the HESA rules in place	SR,SP			F1
G1	Reduce the manual amendment	SP			G1
G2	Minimise the structural and logical errors	SP		G2	
G3	Improve Home and TT PC quality	SP			G3
G4	Remove the manual PC search	SP		G4	
G5	Minimise the errors related to Home, TT, and Correspondence PC to improve data Quality	SP		G5	
G6	Remove the manual incorrect input PC	SP			G6
H1	Sharing data with planning office reduce the report need to be written to planning office	AIS	H1		

	VOS	Stakeholders	
A1	Reliable quality data	AIS, SR, SP	Fundamental
B6	Reliable PC information	AIS	
B8	Quality of information input by students need to be controlled as currently is really poor	AIS	
F1	data approved by HESA toolkit, reflecting the HESA rules in place	SR,SP	
G1	Reduce the manual amendment	SP	More is better
G3	Improve Home and TT PC quality	SP	
G6	Remove the manual incorrect input PC	SP	
B2	Accurate, right Correspondence address to contact student in case they haven't enrolled in	AIS	
B5	Correspondence address to send students not attending graduation, the degree certificate	AIS	
B7	Checking mechanism in place	AIS, SP	Delighter
C1	User -friendly system in place to facilitate the process of providing the personal contact information	AIS	
G2	Minimise the structural and logical errors	SP	
G4	Remove the manual PC search	SP	
G5	Minimise the errors related to Home, TT, and Correspondence PC to improve data Quality	SP	Delighter
B11	Require a mechanism in place for checking and chasing students about their provided info	AIS	
H1	Sharing data with planning office reduce the report need to be written to planning office	AIS	

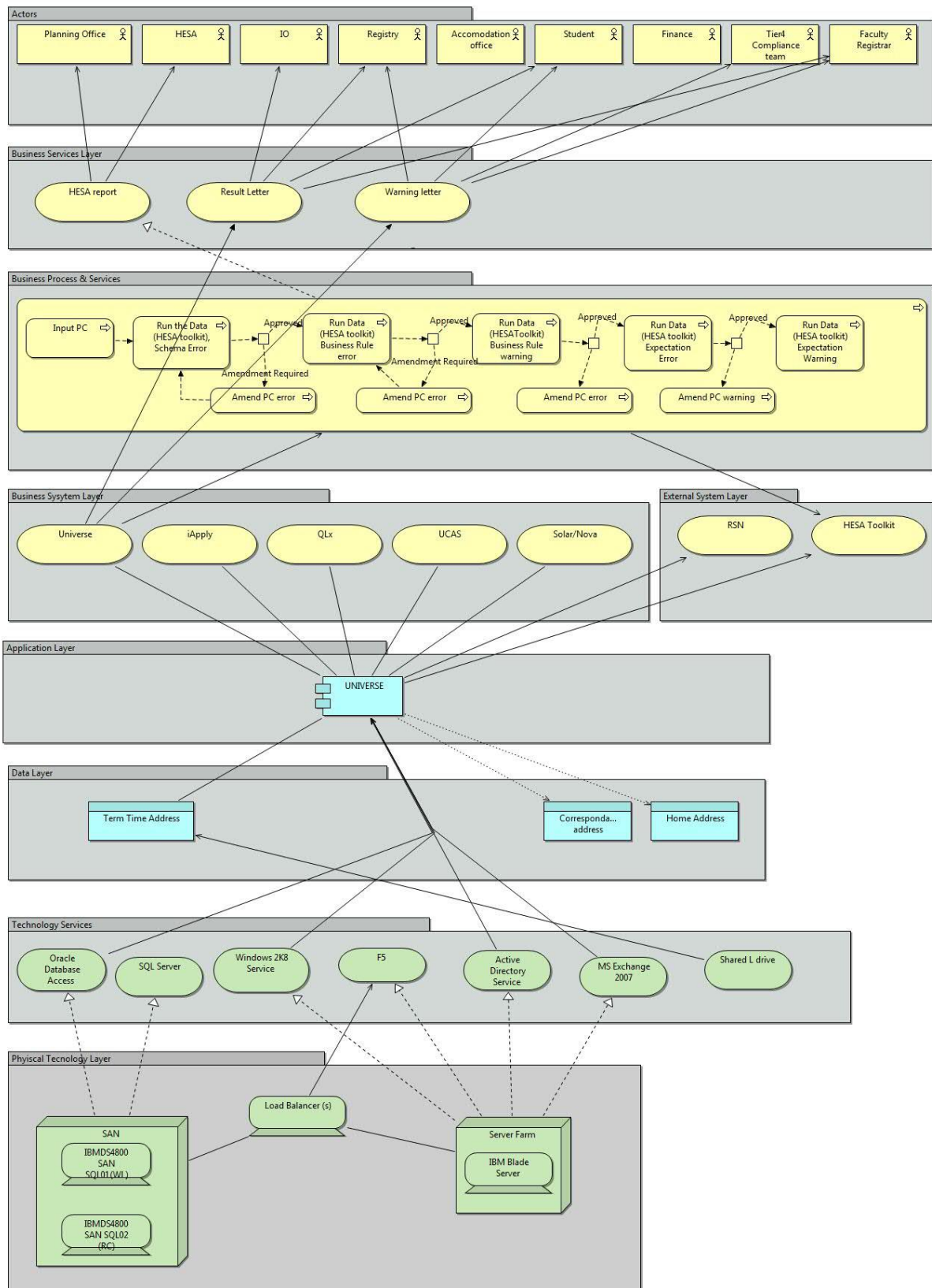
– Stage 7- VOS to Value-drivers

Value-Driver						
A1	VOS	Reliable quality data	Issue	Incomplete, blank, not TT UK base address	Requirements	remove entry error, and maintain the data
						Provide reliable quality student address by removing entry errors and maintaining the data
B6	VOS	Reliable PC information	Issue	Incomplete PC, blank PC, not TT UK base PC	Requirements	remove entry error, and maintain the data
						Provide reliable quality student address by removing entry errors and maintaining the data
B8	VOS	Quality of information input by students need to be controlled as currently is really poor	Issue	SOLAR and iApply accepts any data as PC and address	Requirements	remove entry errors on SOLAR and iApply
						Improving the data input by removing the entry errors in SOLAR and iApply
F1	VOS	data approved by HESA toolkit, reflecting the HESA rules in place	Issue	Structural and Logical errors based on HESA toolkit, which require a rework from PO to remove them	Requirements	HESA rules to be accommodated in data input and data validation
						Maintaining data by eliminating the Structural and Logical errors (HESA rules) on data validation and data input level
G1	VOS	Reduce the manual amendment	Issue	Structural and Logical errors based on HESA toolkit, which require a rework from PO to remove them	Requirements	remove entry errors while maintaining the data
						Provide reliable quality student address by removing entry errors and maintaining the data
G3	VOS	Improve Home and TT PC quality	Issue	The RSN is an external interface, with a one-way information flow from UNIVERSE to RSN, which can result in RSN holding the correct student TT address and UNIVERSE not.	Requirements	Two-way communication between RSN and UNIVERSE
						Two-way information flow between sys holding accurate TT address;-Students TT accommodation data held in RSN to be transferred to UNIVERSE
G6	VOS	Remove the manual incorrect input PC	Issue	SOLAR "view/modify" section of web allows a large number of errors to occur for instance:- invalid PC, international address can be copied over as TT address, and invalid character within the address. The PC checker in place is out of date version. iApply; does not hold any PC checking system	Requirements	Improve data input screen in SOLAR and iApply
						Remove data entry errors in SOLAR and iApply
B2	VOS	Accurate, right Correspondence address to contact student in case they haven't enrolled in	Issue	Student not knowing where the correspondence is going to be used SOLAR technical error, and not checking when it is selected as neither	Requirements	Communication with student Improve the SOLAR correspondence section
						Correspondence definition communication with student and Correspondence address validation
B5	VOS	Correspondence address to send students not attending graduation, the degree certificate	Issue	Student not knowing where the correspondence is going to be used SOLAR technical error, and not checking when it is selected as neither	Requirements	Communication with student Improve the SOLAR correspondence section
						Correspondence definition communication with student and Correspondence address validation
B7	VOS	Checking mechanism in place	Issue	Currently Registry staff can change students addresses following to their change request, and the amendment of staff is done through UNIVERSE	Requirements	Covering both point of data input i.e. UNIVERSE and SOLAR to eliminate the structural errors and remove the risk of manual data input errors
						Checking mechanism in place on SOLAR and UNIVERSE to eliminate structural error and risk of manual data input errors
C1	VOS	User -friendly system in place to facilitate the process of providing the personal contact information	Issue	SOLAR and iApply is time consuming to fill while there is no checking in place for the data input and don't have std field to fill	Requirements	Improve SOLAR and iApply design by accommodating std field and auto-fill
						User-friendly SOLAR and iApply by accommodating auto-fill and std fields in place to facilitate the process of providing the personal contact info
G2	VOS	Minimise the structural and logical errors	Issue	Structural and Logical errors based on HESA toolkit, which require a rework from PO to remove them	Requirements	HESA rules to be accommodated in data input and data validation
						Maintaining data by eliminating the Structural and Logical errors (HESA rules) on data validation and data input level
G4	VOS	Remove the manual PC search	Issue	Structural and Logical errors based on HESA toolkit, which require a rework from PO to remove them	Requirements	Auto-search PC
						Accommodate Auto-search PC to improve data input quality remove manual PC search by
G5	VOS	Minimise the errors related to Home, TT, and Correspondence PC to improve data Quality	Issue	Structural and Logical errors based on HESA toolkit, which require a rework from PO to remove them	Requirements	HESA rules to be accommodated in data input and data validation
						Maintaining data by eliminating the Structural and Logical errors (HESA rules) on data validation and data input level
B11	VOS	Require a mechanism in place for checking and chasing students about their provided info	Issue	there is not mechanism in place to communicate with student that they require to update their provided info	Requirements	investigate point of contact of student with the system and accommodate the communication through them
						Communication mechanism through point of contacts of students with current system to update their provided info
H1	VOS	Sharing data with planning office reduce the report need to be written to planning office	Issue	On-campus student TT is blank or not correct	Requirements	Auto-Sharing info from accommodation system with PO on daily bases
						Link between RSN and UNIVERSE for sharing the correct info for TT address

– Stage 8- Finding the GAP



As-is process Enterprise-Architecture (EA) map

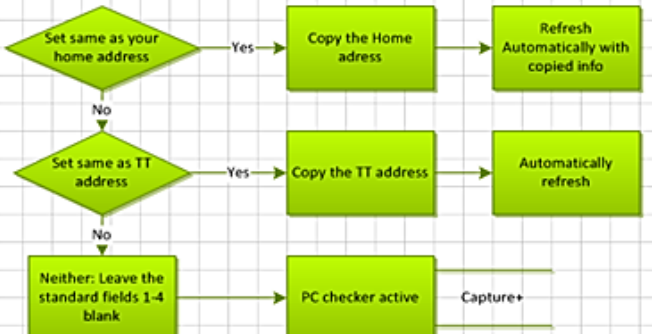


Stage	Actual Output	Value-Drivers	Expected Output
Application Phase	Applicant Home, Correspondence address data	A1 Provide reliable quality student address by removing entry errors and maintaining the data B6 Provide reliable quality student address by removing entry errors and maintaining the data B8 Improving the data input by removing the entry errors in SOLAR and iApply F1 Maintaining data by eliminating the Structural and Logical errors (HESA rules) on data validation and data input G1 Provide reliable quality student address by removing entry errors and maintaining the data G3 Two-way information flow between sys holding accurate TT address;-Students TT accommodation data held in RSN to be transferred to UNIVERSE G6 Remove data entry errors in SOLAR and iApply C1 User-friendly SOLAR and iApply by accommodating auto-fill and std fields in place to facilitate the process of providing the personal contact info G4 Accommodate Auto-search PC to improve data input quality remove manual PC search by maintaining data by eliminating the Structural and Logical errors (HESA rules) on data validation and data input G5 Maintaining data by eliminating the Structural and Logical errors (HESA rules) on data validation and data input B1 Link between RSN and UNIVERSE for sharing the correct info for TT address	Reliable data quality by; -removing entry errors , -two way-information between required systems, -User-friendly data input web -and maintaining/validating data
Enrolment Phase	Student address data to be checked and maintained by PO in a year time	A1 Provide reliable quality student address by removing entry errors and maintaining the data B6 Provide reliable quality student address by removing entry errors and maintaining the data B8 Improving the data input by removing the entry errors in SOLAR and iApply F1 Maintaining data by eliminating the Structural and Logical errors (HESA rules) on data validation and data input G1 Provide reliable quality student address by removing entry errors and maintaining the data G6 Remove data entry errors in SOLAR and iApply B2 Correspondence definition communication with student and Correspondence address validation B5 Correspondence definition communication with student and Correspondence address validation B7 Checking mechanism in place on SOLAR and UNIVERSE to eliminate structural error and risk of manual data input errors C1 User-friendly SOLAR and iApply by accommodating auto-fill and std fields in place to facilitate the process of providing the personal contact info G4 Accommodate Auto-search PC to improve data input quality remove manual PC search by G5 Maintaining data by eliminating the Structural and Logical errors (HESA rules) on data validation and data input	Reliable data quality by; -removing entry errors , -User-friendly data input web -clear communication on Correspondence def -and maintaining/validating data
TT phase	Student TT address (it can stay blank)	A1 Provide reliable quality student address by removing entry errors and maintaining the data B6 Provide reliable quality student address by removing entry errors and maintaining the data F1 Maintaining data by eliminating the Structural and Logical errors (HESA rules) on data validation and data input G1 Provide reliable quality student address by removing entry errors and maintaining the data G3 Two-way information flow between sys holding accurate TT address;-Students TT accommodation data held in RSN to be transferred to UNIVERSE B7 Checking mechanism in place on SOLAR and UNIVERSE to eliminate structural error and risk of manual data input errors G2 Maintaining data by eliminating the Structural and Logical errors (HESA rules) on data validation and data input G4 Accommodate Auto-search PC to improve data input quality remove manual PC search by G5 Maintaining data by eliminating the Structural and Logical errors (HESA rules) on data validation and data input B1 Communication mechanism through point of contacts of students with current system to update their provided	Reliable data quality by; -removing entry errors , -two way-information between required systems, -User-friendly data input web - maintaining/validating data - communication mechanism to contact student after validation
Post TT-phase	Student Correspondence address (it can stay blank)	G2 Maintaining data by eliminating the Structural and Logical errors (HESA rules) on data validation and data input G4 Accommodate Auto-search PC to improve data input quality remove manual PC search by G5 Maintaining data by eliminating the Structural and Logical errors (HESA rules) on data validation and data input B1 Communication mechanism through point of contacts of students with current system to update their provided info	Reliable data quality by; - maintaining/validating data - communication mechanism to contact student after validation

Appendix 22.2 *Improvement Business requirements report*

Introduction; The following functional and non-functional solution requirements are for the PC data quality improvement and where applicable the priority of improvement;

1. SOLAR		
Requirement Description	1.1 Improving SOLAR design by building in additional Decision Points	1.1 Must
	1.2 Improve SOLAR by adding the additional user help via the inclusion of an Information Box (i), i.e. by hovering around the "i" sign the help tool appears;	1.2 Must
	1.2.1 Include the message next to the TT address bar; "It is critical to provide us with your TT address, this address will be used for your Bank, Council, Visa, and other required correspondence. It is also important to ensure that this data remains relevant throughout your studies."	1.2.1 Must
	1.3 Install the new version of PC structural validation by PostcodeAnywhere, i.e. Capture+;	1.3 Must
	1.3.1 Capture+ compatibility with SOLAR needs to be checked, and if it's compatible then linked to PC address within TT, H, & C-Addresses;	1.3.1 Must
Notes / Rationale	1.4 Within the current address fields in SOLAR a minimum set of mandatory data is required "PC" and "Country";	1.4 Must
	1.4.1 Capture+ will allocate the address, and if the PC is not known "House/flat number/name, street" is required before exiting this process.	
	<p>SOLAR is used by UK/EU, International students on campus, and International distance learner students overseas. The Planning Office doesn't require information for students with TT locations overseas³ during their studies. However, the Correspondence address is required and used by Faculties.</p> <p>Within SOLAR, the "View /Modify address" field, allow the students to input their address. The new process SOLAR, by the addition of decision points, helps to accommodate HESA rules (schema error level).</p> <p><u>Term-Time Address section</u> ;</p> <p>1.1 Decision Points in TT address which need to be built in UNIVERSE;</p> <ul style="list-style-type: none"> TT is not required by students studying wholly outside of the UK, therefore if the 'Location of study' is 7 within UNIVERSE, the TT address field needs to be blanked out, leading student to the Home Address. <p>1.2 An information box should include information about the PC;- " i.e. Postal Code, Zip Code, Postal Number";</p> <ul style="list-style-type: none"> Some international students are not familiar with the PC definition; therefore a description on what PC (i) would be helpful. <p>1.4 It is required to have address within; TT address(unless it has been blanked out automatically), therefore the way to communicate with Students with Blank TT address requires to be;</p> <ul style="list-style-type: none"> Remove the permission for student with blank TT, to print online letter from NOVA An notification email to be sent out on monthly basis to all students except the one with location of study coded 7, on Sandwich year, or none-credit bearing courses, notify them to update their TT address Use the Check-in point screen as communication point for international student, when the scan their card in stations every week Because of the non-credit bearing courses containing blank TT address within Student record the quality of data decrease 	
	1.5 Accommodating HESA rules within the SOLAR Home address;-The Home address cannot be the same as TT for international on campus students;	1.5 Must
	1.6 No Copy option to be provided in TT to copy Home address to TT or vice versa for international students	1.6 Must

	<p><u>Home Address:</u></p> <p>1.3 Capture+ provides national and international PC search¹³, Capture+ needs to be incorporated in the Home address PC field;</p> <p>1.4 Regardless of the selected country the address data order remains the same i.e. House name/number, Street, Postcode etc.;</p> <ul style="list-style-type: none"> The minimum input in Home address will be the "Country" before exiting this process; <p>1.5 HESA holds Structural and Logical validation rules in place falling with Schema Error, Business-Rule Error/Warning</p> <p>1.6 Decision point within UNIVERSE, to divide the International from National students, and remove the copy option for international student within SOLAR.</p> <p><u>Correspondence address:</u></p> <p>1.2 To include the note of; "This address will be used for urgent/safe/required documents posting from the University to you. It is also important to ensure that this data remains relevant throughout your studies."</p>  <pre> graph TD A{Set same as your home address} -- Yes --> B[Copy the Home address] B --> C[Refresh Automatically with copied info] A -- No --> D{Set same as TT address} D -- Yes --> E[Copy the TT address] E --> F[Automatically refresh] D -- No --> G[Neither: Leave the standard fields 1-4 blank] G --> H[PC checker active] H --> I[Capture+] </pre> <ul style="list-style-type: none"> If correspondence address has been selected to be set same as the Home address, the address from the Home section needs to be copied over, refresh the page and auto-save, if not; If the correspondence address has been selected to be set same as the TT address, the address from TT section needs to be copied over, refresh the page and auto-save, if not; If the "Neither" option has been selected, then Capture+ should be evoked to create an address; If Capture+ cannot find the address, there is a call for the business to make a decision
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2. <u>iApply</u>						
Requirement Description	2.1 Incorporating Capture+ within the <u>iApply</u> address section to remove manual data input errors;					2.1 Must
	2.1.1 The compatibility on the technical side needs to be checked;					2.1.1 Must
	2.2 Standardise the address fields within <u>iApply</u> , same as SOLAR address fields.					2.2 Must
Notes / Rationale	2.1 The address fields needs to be in the standard order as below across all the application types;					
	House/flat number/name, street	Area/Village	Extra address line(optional)	Town/City	County, Country	Postcode (i)
	<ul style="list-style-type: none">The minimum information to input should be PC for the Capture+ to find the location;If the PC is not known, the Country is required for international and Flat/name number to allocate the location;<u>iApply</u> incorporate the UCAS application process as well, based on the project scope no change requirements been suggested, as the PC checker in the apply2.ucas.com already exists for the Home address.					

¹³

¹³ Postcode Anywhere covers 240 countries, however the extent of details offered differs ; <http://www.postcodeanywhere.co.uk/address-validation/coverage/>

3 UNIVERSE		
Requirement Description	3.1 Data input quality check in place within UNIVERSE ; 3.1.1 Incorporate the web service i.e. Capture+, within UNIVERSE (Admission, table StrStudent , Address field). 3.1.2 Differentiate between International and National students in order to remove copy option from SOLAR, TT section 3.1.3 Allow recognition of students with location of study coded 7 ^a in UNIVERSE, to blank out their TT address within SOLAR 3.1.4 Identifier in UNIVERSE- TTACCOM field , to show students living in University accommodation by truing the 'value' to "1" i.e. institution maintained property	3.1 Must
		3.1.1 Must
		3.1.2 Must
		3.1.3 Must
		3.1.4 Must
Notes / Rationale	<ul style="list-style-type: none"> Currently Registry staff can change students addresses following to their change request through their university email; The amendment by staff is done through UNIVERSE, while students can only make changes in SOLAR; Covering the both points of data input routes, i.e.-UNIVERSE and SOLAR will eliminate the structural errors and remove the risk of manual data input errors; Remove the copy option within SOLAR in TT for international students, will reduce the risk of having international address as TT address for international on campus students; Based on information passed from RSN to UNIVERSE, the students living on campus accommodation require to be highlighted in UNIVERSE. 	

4 RSN		
Requirement Description	4.1 Two-way information flow between RSN and UNIVERSE, to ensure TT information is accurate and relevant; 4.1.1 A student allocated accommodations within the RSN (i.e. TT address) needs to be passed back to UNIVERSE with a regular update frequency; 4.1.2 If the student move within the university accommodation, the change should also be reflected;	4.1 Must
		4.1.1 Must
		4.1.2 Must
		4.1.3 Must
Notes / Rationale	<ul style="list-style-type: none"> In Pre-enrolment period the RSN inputs student data from UNIVERSE; Post-enrolment i.e. Sep-Oct and Jan, RSN holds the TT address for all students accommodated on campus, although this isn't currently passed back to UNIVERSE; Depending on the timescale taken to implement the suggested information flow change, it is suggested to use the opportunity of changing the template of the letter sent out automatically to students by RSN, including the obligation to fill the TT address based on the room allocated to them on the same email (This is a requirement to be done by Accommodation office). 	

5 Proposal to Project Board for decision and awareness		
Requirement Description	5.1 HESA toolkit to be used by Registry Office during the academic year OR Planning Office to use HESA toolkit earlier within academic year to see the benefit; 5.2 As a contingency plan the 'Cleansing' service is available from PostcodeAnywhere , the costing will be in addition to the capture+ service, while The benefit can be extended to National student survey as well; 5.3 The risk existence from manual data input error, where the Capture+ is not able to find the address.	

14

14 Location of Study 7: student studying for the whole of their programme of study (to date) **outside of the U.K.**

Appendix 23 IT Asset Management improvement project

– **Stage 1**-Service Range

Refer to Appendix 17

– **Stage 2**-Selection of the Service

Between the IT service ranges, Hardware and Software asset management been selected for the improvement project by senior management based on years of demand raising request from IT staffs. Because of that stage 1 and 2 had their fixed answer already and we didn't go through it again.

– **Stage 3**- Stakeholder representation and classification

HAM & SAM										
IT- LOCAL DELIVERY	IT-Business Partners	HLS-Faculty Faculty Manager	BES Faculty	BES- Faculty proj accountant	BES- Learning enhancement unit	EC- Resource manager	AD- IT & Media manager	CULC	Procurement	Security
SP	AIS	AIS	SR	AIS	AIS	AIS	AIS	AIS	AIS	AIS

IT Local delivery is the provider of service while faculties are the receiver of the service. Business school has been selected between the faculties, while the requirements of the other faculties have been captured through meeting their IT partners.

– **Stage 4**-Listing the expected attributes by each stakeholder from the Service

The set of standard questions were carried out in order to understand how the stakeholders are involved in the service while asking their expectation;

1. Are you interested in SAM/HAM?
2. Are there any issues with the current way of system/method in use you want to mention?
3. Do you see ITAM beneficial or just administrative burden?
4. Do you know/have what you own as assets?
5. What are their conditions? Where/Value
6. Any process/plan to monitor their condition, breaking point, repetitive monitoring?
7. Do you hold any repair history? How do you get notified an asset require to be repaired?
8. Do you require any communication done from IT to your Faculty?
9. How do you provide any data on asset inventory you hold?
10. How do you manage the request for new software, hardware?
11. Expectation for level of service/how to improve?

<div> <div>Guides & Std</div> <div>Policy & Rules</div> <div>Stakeholders</div> <div>Service-Attribute</div> </div>		Service Range										
		HAM & SAM										
		IT- LOCAL DELIVERY	IT-Business Partners	HLS-Faculty Facility Manager	BES-Faculty	BES- Faculty proj accountant	BES- Learning enhancement unit	EC- Resource manager	AD- IT & Media manager	CULC	Procurement	Security
		SP	AIS	AIS	SR	AIS	AIS	AIS	AIS	AIS	AIS	AIS
A1	A system capable of combined Hardware and Software asset management											
A2	Ability to identify Computers across heterogeneous platforms Windows, Mac, Thin-											
A3	Ability to identify software programs across heterogeneous platforms Windows, Mac, Thin- client.											
A4	Ability to discover different types of Hardware that can connect to the network.											
A5	Ability to discover different types of software installed both server and desktop level											
A6	Ability to monitor usage of hardware											
A7	Ability to monitor peak usage of software											
A8	Ability to work with in SCSM											
A9	Ability to filter out unrelated software programs such as games, music players etc.											
A10	Ability to export report into a Hardware inventory database.											
A11	Ability to export report into a software inventory database.											
A12	Ability to discover and store the location of hardware item											
A13	Ability to discover the last time the software was used											
A14	Ability to store Hardware warranty information (supply management)											
A15	Ability to store software license information.											
A16	Ability to store full Hardware purchasing history											
A17	Ability to store contracts for each software purchased licence.											
A18	Ability to setup Software license expiration alerts											
A19	Ability to store basic information about the software such as requestor, purpose, number of license etc.											
A20	Ability to track the different versions of a software											
A21	Ability to store software costing information.											
A22	Ability to allow access from a team of people (Hardware)											
A23	Ability to store basic information about the hardware such as extra notes field											
A24	Ability to assign Hardware asset tags automatically and/or to be assigned manually											
A25	Ability to link software and hardware together (assigned)											
A26	Ability to provide software cost trend analysis											
A27	Ability to provide Hardware & Software financial reports											
A28	Ability to provide Hardware asset report based on variable criteria.											
A29	Ability to provide different graphical reports related; Hardware age, Hardware cost, Ownership											
A30	Ability to provide different graphical reports related : Installed software's, Software usage, License cost vs. maintenance cost											
A31	Ability to report/link to incident report system to individual hardware items											
A32	Ability to create own reports on Software and Hardware											
A33	Ability to integrate with finance system											
A34	Ability to integrate with SCSM/SCCM system (Hardware side)											
A35	Ability to integrate with RMS/replacement system (Software side)											
A36	Allow offsite Access											
A37	Mobile/App version											
A38	Work through remote desk											
A39	Processing speeds											
A40	reliability											
A41	Operating System											
A42	Server requirements											
A43	Record all related SLA's											
A44	Help Desk											
A45	On line support											
A46	Documentation											
A47	Training											
A48	Initial audit											
B1	Ability to integrate with purchasing system (streamline the process and remove input duplication)											
B2	Clear ownership on software renew/manage											
B3	Report on age, location and % of usage and spec											
C1	Reading access to the up to date hardware and software inventory/status data											
C2	Future plan for managing asset i.e. current state of m/c, what when and how many need to be replaced											
C3	Plan for future available development options; systems and tech e.g. in teaching, timetabling, tablet, smartphones, market shift, etc.											
C4	Hardware ownership and total cost of ownership associate with it to compare, e.g.											
C5	Analysis of comparative costs on options for better decision to be made											
C6	Visibility of current condition											
D1	Visible/accurate Lifespan asset management data											
D2	Improve ITS SLA, by decreasing the LT for m/c to be set (stock in place ready to go)											
D3	Be able to export report data into MS Excel format											
D4	Clear agreement on maintenance agreement, service agreement, or chargeable job for											
E1	Store standard budgetary coding for Hardware and Software											
E2	Training and culture change for Budget management & inputting data & std process											
E3	Asset depreciation management											
E4	Inventory to be used between faculties											
F1	Establish a std process											
F2	Visibility of purchasing process for better communication and able to track the progress											
F3	Advise and guidance in insurance											
F4	Equipment Responsibility by staff during/after employment (all Assetted Equipment)											
G1	Highlights the active and inactive equipment and be able to run a report for insurance											
G2	Internal mechanism to release stock in other part of UNI to get back benefit from it											
G3	Streamlined, robust process											
G4	Control over the security of the Hardware											
H1	Visible state of progress and LT on raised call by Faculty (not only with the person raised the call)											
H2	reduce the manual interaction											
I1	Holds information on configuration											
J1	Visibility of lifecycle											
J2	Dependent requirements											
J3	Who is responsible for the kit in operational level											
J4	Std Commodity coding;- UNSPSC, OR Proche											
K1	Who is accountable, responsible, needs to be informed											

			Comparison	A40	A41	B3	I1	J1	K1		%	
A40	reliability	IT-Security	A40		A40	A40	I1	A40	J1	3	20.0	
A41	Operating System		A41			A41	I1	J1	K1	1	6.7	
B3	Report on age, location and % of usage and spec		B3				B3	J1	K1	1	6.7	
I1	Holds information on configuration		I1					I1	I1	4	26.7	
J1	Visibility of lifecycle		J1						J1	4	26.7	
K1	Who is accountable, responsible, needs to be informed		K1							2	13.3	100.0
										15	6.7	

			Comparison	A15	A19	A21	B1	B3	I1		%	
A15	Ability to store software license information.	CULC-IT	A15		A19	A15,A21	A15	B3	I1	2	12.5	
A19	Ability to store basic information about the software such as requestor, purpose, number of license etc.		A19			A19	A19	B3	I1	3	18.8	
A21	Ability to store software costing information.		A21				B1	B3	I1	1	6.3	
B1	Ability to integrate with purchasing system (streamline the process and remove input duplication)		B1					B3	I1	1	6.3	
B3	Report on age, location and % of usage and spec		B3						B3,I1	5	31.3	
I1	Holds information on configuration		I1							4	25.0	100.0
										16	6.25	

			Comparison	A11	A15	A17	A18	A19	A21	B1	B2	B3		%	
A11	Ability to export report into a software inventory database.	IT-BP	A11		A11	A17	A11	A19	A11	B1	B2	B3	3	7.9	
A15	Ability to store software license information.		A15			A15	A15,A18	A19	A15,A21	B1	B2	B3	3	7.9	
A17	Ability to store contracts for each software purchased licence.		A17				A17	A19	A17	B1	B2	B3	2	5.3	
A18	Ability to setup Software license expiration alerts		A18					A19	A18	B1	B2	B3	2	5.3	
A19	Ability to store basic information about the software such as requestor, purpose, number of license etc.		A19						A19	A19	A19	A19,B3	8	21.1	
A21	Ability to store software costing information.		A21							B1	B2	B3	1	2.6	
B1	Ability to integrate with purchasing system (streamline the process and remove input duplication)		B1								B1	B3	6	15.8	
B2	Clear ownership on software renew/manage		B2									B3	5	13.2	
B3	Report on age, location and % of usage and spec		B3										8	21.1	100.0
													38	2.6	

			Comparison	A11	B3	C1	C2	C3	C5	C6		%	
A11	Ability to export report into a software inventory database.	HLS	A11		A11,B3	C1	C2	C3	C5	C6	1	4.0	
B3	Report on age, location and % of usage and spec		B3			B3,C1	C2	C3	C5	C6	1	4.0	
C1	Reading access to the up to date hardware and software inventory/status data		C1				C1	C1	C1,C5	C1,C6	5	20.0	
C2	Future plan for managing asset i.e. current state of m/c, what when and how many need to be replaced		C2					C2,C3	C2,C5	C6	4	16.0	
C3	Plan for future available development options; systems and tech e.g. in teaching, timetabling, tablet,		C3						C3, C5	C3	5	20.0	
C5	Analysis of comparative costs on options for better decision to be made		C5							C5	5	20.0	
C6	Visibility of current condition		C6								4	16.0	100.0
											25	4.0	

			Comparison	A7	B1	B3	C1	C2	C3	C5	C6	D1	D3	D4	A30	A43		%
A7	Ability to monitor peak usage of software	BES-faculty	A7		A7	B3	C1	C2	C3	C5	C6	D1	D3	A7	A30	A7	2	1.8
B1	Ability to integrate with purchasing system (streamline the process and remove input duplication)		B1			B1,B3	C1	C2	C3	C5	C6	B1,D1	D3	D4	A30	A43	2	1.8
B3	Report on age, location and % of usage and spec		B3				B3,C1	B3,C2	B3,C3	B3,C5	B3,C6	B3,D1	B3,D3	B3	B3,A30	B3	12	10.8
C1	Reading access to the up to date hardware and software inventory/status data		C1					C1,C2	C1,C3	C1,C5	C1,C6	C1,D1	C1,D3	C1	C1,A30	C1	12	10.8
C2	Future plan for managing asset i.e. current state of m/c, what when and how many need to be replaced		C2						C2,C3	C2,C5	C2,C6	C2,D1	C2,D3	C2	C2,A30	C2	12	10.8
C3	Plan for future available development options; systems and tech e.g. in teaching, timetabling, tablet,		C3							C3,C5	C3,C6	C3,D1	C3,D3	C3	C3,A30	C3	12	10.8
C5	Analysis of comparative costs on options for better decision to be made		C5								C5,C6	C5,D1	C5,D3	C5	C5,A30	C5	12	10.8
C6	Visibility of current condition		C6									C6,D1	C6	C6	C6	C6	11	9.9
D1	Visible/accurate Lifespan asset management data		D1										D1	D1	D1	D1	12	10.8
D3	Be able to export report data into MS Excel format		D3											D4	D3,A30	D3	9	8.1
D4	Clear agreement on maintenance agreement, service agreement, or chargeable job for faculty		D4												D4	D4,A43	4	3.6
A30	Ability to provide different graphical reports related : Installed software's, Software usage, License cost		A30													A43	8.0	7.2
A43	Record all related SLA's		A43														3	2.7
																	111	0.9009

			Comparison	A15	B1	B3	C1	C2	C3	C5	C6	D1	F1	F2	F3	F4		%
A15	Ability to store software license information.	BES-Learning Enhancement Unit	A15		A15	A15	C1	A15	C3	A15,C5	A15	D1	A15	F2	F3	F4	6	6.5
B1	Ability to integrate with purchasing system (streamline the process and remove input duplication)		B1			B1	C1	C2	C3	C5	B1	D1	B1	F2	F3	F4	3	3.2
B3	Report on age, location and % of usage and spec		B3				C1	C2	C3	C5	B3	D1	B3	F2	C3	F4	2	2.2
C1	Reading access to the up to date hardware and software inventory/status data		C1					C1	C1	C1,C5	C1,C6	C1,D1	C1	C1,F2	C1	C1	12	12.9
C2	Future plan for managing asset i.e. current state of m/c, what when and how many need to be replaced		C2						C3	C5	C2	C2,D1	C2	F2	C2	C2	8	8.6
C3	Plan for future available development options; systems and tech e.g. in teaching, timetabling, tablet,		C3							C3,C5	C3	C3,D1	C3	F2	C3	C3	11	11.8
C5	Analysis of comparative costs on options for better decision to be made		C5								C5	D1	F1,C5	F2	C5	C5,F4	10	10.8
C6	Visibility of current condition		C6									C6,D1	C6,F1	F2	C6	C6	5	5.4
D1	Visible/accurate Lifespan asset management data		D1										D1,F1	D1,F2	D1	D1	12	12.9
F1	Establish a std process		F1											F2	F1	F1,F4	4	4.3
F2	Visibility of purchasing process for better communication and able to track the progress		F2												F2	F2	12	12.9
F3	Advise and guidance in insurance		F3													F4	2	2.2
F4	Equipment Responsibility by staff during/after employment (all Assetted Equipment)		F4														6	6.5
																	93	1.07527

			Comparison	A33	C1	D1	F1	F2	H1	H2		%
A33	Ability to integrate with finance system	AD- IT & Media manager	A33		A33,C1	D1	A33,F1	F2	H1	H2	2	7.4
C1	Reading access to the up to date hardware and software inventory/status data		C1			C1,D1	C1	C1,F2	C1,H1	C1	5	18.5
D1	Visible/accurate Lifespan asset management data		D1				D1	F2	H1	D1	4	14.8
F1	Establish a std process		F1					F2	H1	F1,H2	2	7.4
F2	Visibility of purchasing process for better communication and able to track the progress		F2						F2,H1	F2	6	22.2
H1	Visible state of progress and LT on raised call by Faculty (not only with the person raised the call)		H1							H1	6	22.2
H2	reduce the manual interaction		H2								2	7.4
											27	3.7

			Comparison	A1	A3	A5	A7	A11	A13	A15	A17	A18	A19	A20	A21	A26	A30	A32	A33	A43	B1	B2	C2	D1	F1	F2	J1	J2	%	
A1	A system capable of combined Hardware and Software asset management		A1	A1	A1	A1	A1	A1	A1	A15	A1	A18	A19	A1	A21	A1	A1	A1	A1,A33	A43	A1	B2	A1	D1	F1	A1	J1	J2	14	4.3
A3	Ability to identify software programs across heterogeneous platforms Windows, Mac, Thin- client.		A3		A3,A5	A3	A11	A3	A3	A15	A17	A18	A19	A20	A21	A26	A30	A32	A33	A3	A3	B2	A3	D1	F1	A3	A3	J2		
A5	Ability to discover different types of software installed both server and desktop level		A5				A7	A5,A11	A5	A5	A17	A5	A5	A5,A20	A5	A26	A30	A32	A33	A5	A5	B2	A5	D1	F1	A5	A5	J2	12	3.7
A7	Ability to monitor peak usage of software		A7					A11	A7,A13	A15	A17	A18	A19	A20	A21	A26	A30	A32	A33	A7	A7	B2	A7	D1	F1	A7	A7	J2	7	2.2
A11	Ability to export report into a software inventory database.		A11						A11	A11	A11	A19	A11	A21	A26	A11	A11	A33	A11	A11	B2	C2	D1	F1	F2	J1	J2	12	3.7	
A13	Ability to discover the last time the software was used		A13							A15	A13,A17	A13	A13	A20	A13	A13	A30	A32	A33	A13	A13	B2	C2	D1	F1	A13	J1	J2	9	2.8
A15	Ability to store software license information.		A15							A15,A17	A18	A15,A19	A15	A21	A26	A15	A32	A33	A15	A15	B2	A15	D1	F1	A15	A15	J2	11	3.4	
A17	Ability to store contracts for each software purchased licence.		A17								A18	A19	A17,A20	A17,A21	A17,A26	A30	A32	A33	A17	A17	B2	A17	D1	F1	A17	A17	J2	13	4.0	
A18	Ability to setup Software license expiration alerts		A18									A18,A19	A18	A18	A26	A18	A18	A33	A18	A18	B2	A18	D1	F1	A18	A18	J2	15	4.6	
A19	Ability to store basic information about the software such as requestor, purpose, number of license etc.		A19										A19	A19	A30	A32	A33	A19	A19	B2	A19	D1	F1	F2	A19,J1	J2	14	4.3		
A20	Ability to track the different versions of a software		A20											A20	A26	A20	A20	A33	A20	A20	B2	A20	D1	F1	A20	A20,J1	J2	13	4.0	
A21	Ability to store software costing information.		A21												A20,A21	A21	A21	A33	A21	A21,B1	B2	A21,C2	D1	F1	A21	A21	J2	14	4.3	
A26	Ability to provide software cost trend analysis		A26													A26	A26	A33	A26	A26,B1	B2	A26	D1	F1	A26	A26	J2	14	4.3	
A30	Ability to provide different graphical reports related : Installed software's, Software usage, License cost		A30													A32	A33	A43	A32	B1	B2	A30	D1	F1	F2	J1	J2	8	2.5	
A32	Ability to create own reports on Software and Hardware		A32														A33	A43	A32	B2	A32	D1	F1	A30,F2	A30,J1	J2	10	3.1		
A33	Ability to integrate with finance system		A33															A33	A33	A33,B2	A33	A33,B2	A33	D1	F1	A43	A43	J2	24	7.4
A43	Record all related SLA's		A43																A43	A43	A43	A43	D1	F1	A43	J1	J2	6	1.9	
B1	Ability to integrate with purchasing system (streamline the process and remove input duplication)		B1																		B2	C2	D1	F1	B1,F2	J1	J2	4	1.2	
B2	Clear ownership on software renew/manage		B2																			B2	B2,D1	B2,F1	B2	B2,J1	B2,J2	24	7.4	
C2	Future plan for managing asset i.e. current state of m/c, what when and how many need to be replaced		C2																				D1	F1	C2	J1	J2	4	1.2	
D1	Visible/accurate Lifespan asset management data		D1																				D1	F1	D1	D1,J1	D1,J2	24	7.4	
F1	Establish a std process		F1																					D1	F1	F1,J2	24	7.4		
F2	Visibility of purchasing process for better communication and able to track the progress		F2																						J1	J2	3.0	0.9		
J1	Visibility of lifecycle		J1																								J1,J2	12	3.7	
J2	Dependent requirements		J2																									24	7.4	100
																												323	0.3096	

– **Stage 6-** Trade-off between Business Performance and VOS

	VOS	Stakeholders	Business
A3	Ability to identify software programs across heterogeneous platforms Windows, Mac, Thin- client.	SP	Fundamental
A5	Ability to discover different types of software installed both server and desktop level	SP	
A11	Ability to export report into a software inventory database	SP	
A18	Ability to setup Software license expiration alerts	SP	
A20	Ability to track the different versions of a software	SP	
B3	Report on age, location and % of usage and spec	SR,AIS	
C1	Reading access to the up to date hardware and software inventory/status data	SR,AIS	
D1	Visible/accurate Lifespan asset management data	SR,AIS	
E1	Store standard budgetary coding for Hardware and Software	AIS	
F1	Establish a std process	AIS	
F2	Visibility of purchasing process for better communication and able to track the progress	AIS	
J1	Visibility of lifecycle	AIS	
J2	Dependent requirements	AIS	
A19	Ability to store basic information about the software such as requestor, purpose, number of license etc.	AIS	The more better
A40	reliability	SP	
A41	Operating System	SP	
B2	Clear ownership on software renew/manage	AIS	
H1	Visible state of progress and LT on raised call by Faculty (not only with the person raised the call)	AIS	
I1	Holds information on configuration	AIS	
A33	Ability to integrate with finance system	AIS	Delighter
C2	Future plan for managing asset i.e. current state of m/c, what when and how many need to be replaced	SR	
C3	Plan for future available development options; systems and tech e.g. in teaching, timetabling, tablet,	SR,AIS	
C5	Analysis of comparative costs on options for better decision to be made	SR,AIS	

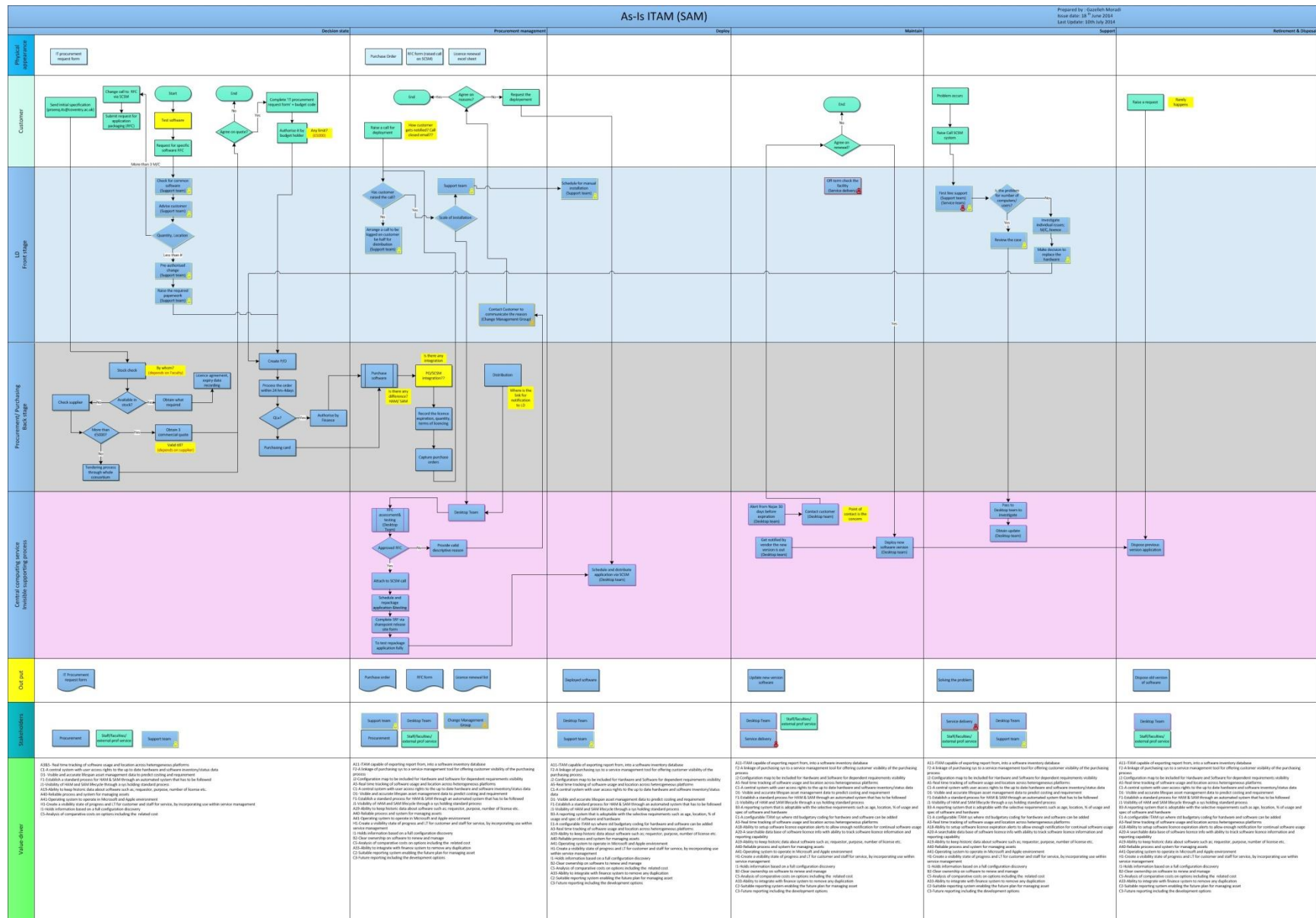
– Stage 7- VOS to Value-drivers

A3	VOS	Ability to identify software programs across heterogeneous platforms Windows, Mac, Thin-client	Issue	we can't track the use of software across university devices. This doesn't allow us to provide most cost effective use software.	Requirements	Real time tracking of software usage and locations	Real time tracking of software usage and location across heterogeneous platforms	SAM
A5	VOS	Ability to discover different types of software installed both server and desktop level	Issue	we can't track the use of software across university devices. This doesn't allow us to provide most cost effective use software.	Requirements	Real time tracking of software usage and locations	Real time tracking of software usage and location across heterogeneous platforms	
A11	VOS	Ability to export report into a software inventory database	Issue	it doesn't allow replications in other areas for backup and reporting	Requirements	A sys that has reporting capability	ITAM capable of exporting report from, into a software inventory database	
A18	VOS	Ability to setup software license expiration alerts	Issue	Licenses can run out and then have to be quickly replaced and this cause a break in service	Requirements	To allow enough notification to purchase licences for continual software usage	Ability to setup software licence expiration alerts to allow enough notification for continual software usage	
A20	VOS	Ability to track the different versions of a software	Issue	sometimes we don't know if we got the most update software, it also highlights support requirements and issues	Requirements	A searchable data base of info with reporting capabilities	A searchable data base of software licence info with ability to track software licence information and reporting capability	
B3	VOS	Report on age, location and % of usage and spec of software and hardware	Issue	v.difficult to plan budgetary and usage requirements going fw	Requirements	a reporting sys that is adoptable with the requirements that we put in	A reporting system that is adoptable with the selective requirements such as age, location, % of usage and spec of software and hardware	General
C1	VOS	Reading access to the up to date hardware and software inventory/status data	Issue	we currently don't have access for everyone to get info, time consuming to share info	Requirements	A central sys with user rights	A central system with user access rights to the up to date hardware and software inventory/status data	
E1	VOS	Store standard budgetary coding for hardware and software	Issue	No std coding, effort required to process orders	Requirements	configurable sys where info can be added	A configurable ITAM sys where std budgetary coding for hardware and software can be added	
F2	VOS	Visibility of the purchasing process for better communication and able to track the progress	Issue	effort required to update customers, where currently there isn't any self-supporting sys	Requirements	a linking to service management tool (e.g. SCSM)	A linkage of purchasing sys to a service management tool for offering customer visibility of the purchasing process	
F1	VOS	Establish a standard process for HAM & SAM	Issue	Currently processes cause delays through lack of std	Requirements	an automated sys that has to be followed in order to process	Establish a standard process for HAM & SAM through an automated system that has to be followed	
J1	VOS	Visibility of HAM and SAM lifecycle	Issue	customers are unaware of requirements to be completed to obtain Hardware and Software	Requirements	a sys to highlight the std processes	Visibility of HAM and SAM lifecycle through a sys holding standard process	
J2	VOS	Hardware and software dependent requirements	Issue	unaware of how loos of one sys can effect the other (lack of config mapping)	Requirements	u need to have config map to be included	Configuration map to be included for Hardware and Software for dependent requirements visibility	
D1	VOS	Visible/accurate lifespan asset management data	Issue	v.hard to predict costing and requirement for each year	Requirements	a sys to record the lifespan	Visible and accurate lifespan asset management data to predict costing and requirement	
A19	VOS	Ability to store basic information about the software such as requestor, purpose, number of license etc.	Issue	can't easily track past history of purchases	Requirements	ability to keep historic data and use it	Ability to keep historic data about software such as; requestor, purpose, number of license etc.	SAM
B2	VOS	Clear ownership on software renew/manage	Issue	currently can be difficult to locate ownership so that decision can be implemented	Requirements	ability to keep historic data and use it	Clear ownership on software to renew and manage	
A40	VOS	Reliability	Issue	cause of lack of confidence for staff with current processes	Requirements	reliable sys	Reliable process and system for managing assets	General
A41	VOS	Operating System	Issue	needs to be incorporated in our working environment	Requirements	to operate in Microsoft and Apple environment	Operating system to operate in Microsoft and Apple environment	
H1	VOS	Visible state of progress and LT on raised call by Faculty (not only with the person raised the call)	Issue	users need to be able to easily track the working details with respect to hardware and software	Requirements	incorporated use within service management tool which supplies visibility to the customer	Create a visibility state of progress and LT for customer and staff for service, by incorporating use within service management tool	
I1	VOS	Holds information on configuration	Issue	Items of the same model or make can have different config and this needs to be shown, allowing for a better maintenance processes	Requirements	a full config discovery	Holds information based on a full configuration discovery	

[illegible]

		SAM	
Stage	Actual Output	Value-drivers	Expected Output
Decision state	IT Procurement request form	A3 Real time tracking of software usage and location across heterogeneous platforms	A central system with visible and accurate lifespan asset management data and state of progress (i.e. LT), with reliable standard process to track software usage and location across heterogeneous platforms, keep historic data, predict costing and requirements, analysis comparative costs on options, while holding information based on a full configuration discovery
		A5 Real time tracking of software usage and location across heterogeneous platforms	
		C1 A central system with user access rights to the up to date hardware and software inventory/status data	
		D1 Visible and accurate lifespan asset management data to predict costing and requirement	
		F1 Establish a standard process for HAM & SAM through an automated system that has to be followed	
		J1 Visibility of HAM and SAM lifecycle through a sys holding standard process	
		A19 Ability to keep historic data about software such as; requestor, purpose, number of license etc.	
		A40 Reliable process and system for managing assets	
		A41 Operating system to operate in Microsoft and Apple environment	
		H1 Create a visibility state of progress and LT for customer and staff for service, by incorporating use within service management tool	
Procurement management	Purchase order and/or RFC form Licence renewal list	I1 Holds information based on a full configuration discovery	Visibility of a SAM lifecycle with clear ownership and progress of order within a reliable standard process, with capability of exporting report, a linkage to purchasing and finance sys, setting user access right, configuration map for dependent visibility, keeping historic data, analysis of comparative costs, reporting on future plan and development option
		C9 Analysis of comparative costs on options including the related cost	
		A11 ITAM capable of exporting report from, into a software inventory database	
		F2 A linkage of purchasing sys to a service management tool for offering customer visibility of the purchasing process	
		J2 Configuration map to be included for Hardware and Software for dependent requirements visibility	
		A5 Real time tracking of software usage and location across heterogeneous platforms	
		C1 A central system with user access rights to the up to date hardware and software inventory/status data	
		D1 Visible and accurate lifespan asset management data to predict costing and requirement	
		F1 Establish a standard process for HAM & SAM through an automated system that has to be followed	
		J1 Visibility of HAM and SAM lifecycle through a sys holding standard process	
		A19 Ability to keep historic data about software such as; requestor, purpose, number of license etc.	
		A40 Reliable process and system for managing assets	
		A41 Operating system to operate in Microsoft and Apple environment	
		H1 Create a visibility state of progress and LT for customer and staff for service, by incorporating use within service management tool	
		I1 Holds information based on a full configuration discovery	
		B2 Clear ownership on software to renew and manage	
		C9 Analysis of comparative costs on options including the related cost	
		A19 Ability to integrate with finance system to remove any duplication	
		C2 Suitable reporting system enabling the future plan for managing asset	
		C3 Future reportine including the development options	

Support	Solve the problem	A11	ITAM capable of exporting report from, into a software inventory database	Visibility of a SAM lifecycle with clear ownership and progress of order within a reliable standard process, with capability of exporting report, a linkage to purchasing and finance sys, setting user access right, configuration map for dependent visibility, keeping historic data, analysis of comparative costs, setting up licence expiration alert, searchable software licence data base, reporting adoptable on selective requirements , future plan and development option
		F2	A linkage of purchasing sys to a service management tool for offering customer visibility of the purchasing process	
		J2	Configuration map to be included for Hardware and Software for dependent requirements visibility	
		A5	Real time tracking of software usage and location across heterogeneous platforms	
		C1	A central system with user access rights to the up to date hardware and software inventory/status data	
		D1	Visible and accurate lifespan asset management data to predict costing and requirement	
		F1	Establish a standard process for HAM & SAM through an automated system that has to be followed	
		J1	Visibility of HAM and SAM lifecycle through a sys holding standard process	
		B3	A reporting system that is adoptable with the selective requirements such as age, location, % of usage and spec of software and hardware	
		E1	A configurable ITAM sys where std budgetary coding for hardware and software can be added	
		A3	Real time tracking of software usage and location across heterogeneous platforms	
		A18	Ability to setup software licence expiration alerts to allow enough notification for continual software usage	
		A20	A searchable data base of software licence info with ability to track software licence information and reporting capability	
		A19	Ability to keep historic data about software such as; requestor, purpose, number of license etc.	
		A40	Reliable process and system for managing assets	
		A41	Operating system to operate in Microsoft and Apple environment	
		H1	Create a visibility state of progress and LT for customer and staff for service, by incorporating use within service management tool	
		I1	Holds information based on a full configuration discovery	
		B2	Clear ownership on software to renew and manage	
		C5	Analysis of comparative costs on options including the related cost	
		A13	Ability to integrate with finance system to remove any duplication	
		C2	Suitable reporting system enabling the future plan for managing asset	
		C3	Future reporting including the development options	
Retirement & Disposal	Dispose old version of software	A11	ITAM capable of exporting report from, into a software inventory database	Visibility of a SAM lifecycle with clear ownership and progress of order within a reliable standard process, with capability of exporting report, a linkage to purchasing and finance sys, setting user access right, configuration map for dependent visibility, keeping historic data, analysis of comparative costs, setting up licence expiration alert, searchable software licence data base, reporting adoptable on selective requirements , future plan and development option
		F2	A linkage of purchasing sys to a service management tool for offering customer visibility of the purchasing process	
		J2	Configuration map to be included for Hardware and Software for dependent requirements visibility	
		A5	Real time tracking of software usage and location across heterogeneous platforms	
		C1	A central system with user access rights to the up to date hardware and software inventory/status data	
		D1	Visible and accurate lifespan asset management data to predict costing and requirement	
		F1	Establish a standard process for HAM & SAM through an automated system that has to be followed	
		J1	Visibility of HAM and SAM lifecycle through a sys holding standard process	
		B3	A reporting system that is adoptable with the selective requirements such as age, location, % of usage and spec of software and hardware	
		E1	A configurable ITAM sys where std budgetary coding for hardware and software can be added	
		A3	Real time tracking of software usage and location across heterogeneous platforms	
		A18	Ability to setup software licence expiration alerts to allow enough notification for continual software usage	
		A20	A searchable data base of software licence info with ability to track software licence information and reporting capability	
		A19	Ability to keep historic data about software such as; requestor, purpose, number of license etc.	
		A40	Reliable process and system for managing assets	
		A41	Operating system to operate in Microsoft and Apple environment	
		H1	Create a visibility state of progress and LT for customer and staff for service, by incorporating use within service management tool	
		I1	Holds information based on a full configuration discovery	
		B2	Clear ownership on software to renew and manage	
		C5	Analysis of comparative costs on options including the related cost	
		A13	Ability to integrate with finance system to remove any duplication	
		C2	Suitable reporting system enabling the future plan for managing asset	
		C3	Future reporting including the development options	



Appendix 24 *List of Published Conference Papers*

Moradi, G., Martin, S. (2012) "Lean improvement and Organizational Structure", University of Portsmouth Lean Conference, Jan 25th 2012, UK

Macintyre, M., Garner, W., Moradi, G., Murphy, S., Macintyre, A., Evans, P., Preece, A. (2011) "Techniques for managing grade predictions for secondary school pupils in England- Proceedings of 5TH International Technology, Education& Development Conference (IATED), INTED2011 , 3780-3789, ISSN:2340-1079, 7-9 March2011,Valencia, Spain.

Moradi, G., Garner, G., Jarvis, P. (2010) "Implementation of Visual Control Systems in to Low volume High Mix Manufacture-International Conference", WASET2010, ICETM, June 28-30, 2010, Proceeding WASET Journal2010, ISSN:2070-3724 & ISSN:2070-3740, Paris, France.

Exhibit 1

Moradi, G., Martin, S. (2012) “Lean improvement and Organizational Structure”,
University of Portsmouth Lean Conference, Jan 25th 2012, UK

Lean improvement and Organisational structure

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Keywords: Lean, Organisation, Service Industry

Extended Abstract

1. Introduction

Increasing understanding of organisation structure type and the differences which might exist within organisation in which lean is being developed might help us to implement lean more effectively. Lean had been around as a more recent management strategy or methodology for business operation and improvement since the 1990s, developed initially to support low-variety high volume manufacture within the automotive industry it has continued to develop and gained traction with all sizes of organisations in many different business sectors.

Success within manufacturing has led to it being applied to service sector organisation and this has identified a number of challenges not least of which is the organisational structure that may currently exist which determines the modes in which it operates and performs and the extent to which it would support currently the introduction of a lean culture or the extent to which it may have to change.

2. Organisational Structure

Organisational structure is like a platform, where lean performs. Therefore knowing more about this platform would help us to apply changes to organisational structure, with better knowledge and understanding.

Daft, R.L., (2007) describes organisations as (1) social entities that (2) are goal-orientated, (3) are designed as deliberately structured and coordinated activity systems and (4) are linked to the external environment. An organisation exists when people cooperate together towards a main goal. That's what makes the new approach to management for empowering the employees while they are contributing. Organisation cannot exist without interaction with external world i.e. competitors, suppliers, customers. Some organisation manufacture specific product and some provide service even they are different in size and type of ownership. They can be either for-profit or non-profit. Depending on type of the organisation dealing with customer will defer. For example in non-profit organisation the manager must market their service while trying to attract volunteers to provide this at an appropriate level.

Industry is a generic description covering several activities which add value to a "product" or provide a "service". According to Parrish, (1990) industry can also be categorized as;

1. Service; e.g. transport, tourism.
2. Process; e.g. chemical production
3. Manufacturing; e.g. Automotive

Circa 200 years ago the emerging industry was revolutionised with the invention of steam power and mechanised equipments. This provided a significant rise in productivity compared to the previous craft-based industry arrangement. At the turn of this century and continuing to present day, along with technical innovation, the principles of scientific management were developed (Taylor, 1947) and have been employed to make the use of equipment and application of this work-force more effective.

Identified in Parrish, (1990) Manufacturing industry has thus progressed through the phases of:

1. Industrialization is a process of social and economical change where can be explained as “the extensive organisation of an economy for the purpose of manufacturing” (Sullivan, 2003).
2. Mechanization can be defined as a volume production process involving machines controlled by human. Mechanization happened in industry revolution when the use of machine technology took over the work previously done by humans. This had reduced greatly unit labour costs.
3. Automation (computerization), where it aimed to further reduction of the total manufacturing costs through more effective usage of production data to enable effective planning of the available time. Computer application occurred initially in the process industries and the technical and planning departments of manufacturing industry.
4. Integration (linking), where enabled better organization of material and information flows. The integration made the organisation to move to a stage where individual “islands” can be integrated with each other.

Integration implies taking a holistic or system thinking approach to organisational design, how processes are viewed and the concept of value within the organisation.

According to Emiliani, (2004), based on the Toyota Production System (Denis, 2010) the philosophy of Lean has become a recognised management system which is designed to be more productive and deliver better outcomes for key stakeholders such as associates, suppliers, customers, investors, and communities and takes account of whole organisation requirements.

Research (Hines, 2010) has identified five elements behind the commercial success that Toyota as a manufacturing organisation has had through the deployment of Lean principles:

- Policy deployment to focus everyone in the same direction based on what adds value to their internal and external customers
- Deploying through a series of cross functional processes, the most important of which Toyota describes as quality, cost and delivery.
- Value stream management
- Set of tools is applied contingent on circumstance, i.e. pulled by the customer and business need

- Finally all the four areas are applied in extended enterprise (Hines P. 2010)

Policy deployment as Hines (2010) specifies has the purpose to align and engage everyone with the external customers with the goals of the business, which can make a common aim in achieving customer (business) requirement. Depending on type of the organisation we are dealing with, the culture and people as well as the structure of the organisation is likely to be different. The successful policy deployment of what constitutes customer value has presented as a challenge (Hines, 2010) when communicating the need for change throughout the organisation.

Based on Toyota (2001) a feature central to the Lean philosophy is Continuous Improvement along with respect for people (Emiliani, 2004). Continuous improvement indicates the change loop as a never ending process which makes the organisation - as a whole - more effective. According to Jackson, (2003), fundamentally simple solutions fail because they are neither holistic nor creative enough. The Holistic view requires considering organisations as a system with subsystem and supra systems, through which any changes need to be planned, based on the impact and need of subsystems to improve the system.

As philosophy, Lean has developed from its application to the manufacturing discipline only to the wider more holistic application as Lean Thinking. In this respect it is being successfully applied outside of the narrow manufacturing discipline to service delivery within manufacturing organisations and to service providers themselves. For example in sectors including:

- logistics and distribution,
- services; such as law enforcement, insurance, uniformed services, city banking, service bureaus
- retail (supply chain sector)
- healthcare,
- construction, maintenance, and
- even government; such state governance agencies, Council

3. Toyota structure and service structure

The Toyota Production System (TPS) is synonymous with “lean production” or “lean manufacturing,” a term coined by researchers in the International Motor Vehicle Program at the Massachusetts Institute of Technology (MIT) (Womack, 1990) and Toyota is recognised as the first company to have applied Lean principles in its own organisation and as a company they are acknowledged as world leaders in the automotive manufacturing industry. Although not completely invulnerable to performance issues, as recent press coverage has shown, Toyota keep bringing to market innovative products, to build market share globally, and remain profitable. As a company they are very willing to share their approach to manufacturing widely. And the tools and techniques used throughout the organisation have been adopted by others however; there is more to their approach than just the application of the tools and techniques of Lean.

Just as they themselves are prepared to share their knowledge so one of Toyota’s other strengths has been the ability to learn from others, such as Ford Motor Company, quality gurus and industrial engineers from the United States, Japan, and Europe, and then carefully adapt this knowledge to its own internal systems (Morgan, 2006).

In order to achieve the organisational goals and objectives of an organisation an individual's work needs to be coordinated and managed. The organisation and reporting structure is a valuable means by which this can be gained.

Organisational structure specifies:

1. Reporting relationships
2. Delineates formal communicational channel
3. Describes how separate action of individual are linked together. (Bauer, 2009)

In broad terms the structure of an organisation can be either an approach that emphasised top-down hierarchy (a vertical structure) which leaves the rules and regulation and authority in hands of executive managers, or a more horizontal structure that encourages and enables cross-functional collaboration and communication. Hierarchy of authority tends to be tall when spans of control are narrow, and when the spans of control are wide the hierarchy of authority tend to be flatter with a higher degree of autonomy for individual actions. Kanigel, (1997) postulates that decisions about organisational structure and individual job design should be based on precise, scientific study of each individual situation (Kanigel 1997) in order to provide the best 'fit' to meet customer service.

Hurst, (1995) describes an organisational structure in which activities are grouped together by common work (function) from bottom to the top. In this type of organisation whole organisation coordinates and collaborates through the vertical hierarchy, and the decision-making authority resides with upper level managers. This would leave them with little collaboration across functional departments. In current rapidly changing environment, top executive are not able to respond rapidly enough to either problems or opportunities. This is due not only to the environment but also to the manager who is overloaded with making decisions and providing authorisation. On the other hand, the organisations that are structured around the processes (work streams) rather than functions are often able to operate and manage horizontally using a matrix management approach. For example, rather than having a few senior executives, self-directed teams are put in place. Each team consists of members from several function areas therefore the boundaries between functions are reduces and eliminated.

Vertical Structure	Rigid Culture	Horizontal Structure	Adaptive Culture
	Competitive Strategy		Collaborative Strategy
	Formal System		Shared information
	Routine task		Empowered Roles

Table 1.1 Two organisations Design Approach (Hurst D, 1995)

Toyota's production system, with its emphasis on continuous learning and improvement, and matrix structure are among the reasons for the company's leadership in the automotive industry (Bauer, 2009). The matrix structure combines groups of employees by both functions and product which means combining the traditional functional structure with a

product structure. With each employee (or associate) reporting to a department manager as well as a project or product manager to meet different but related objectives.

Continuous improvement implies continuous change but incrementally. Toyota gain people's commitment to remove and avoid waste and to improve, by being committed to people, empowering and supporting them in participating in changes. The structure in place facilitates constant learning as well as engendering the culture of problem solving by expecting employees at all levels to analyse actual and expected performance and to focus on adding value. Toyota bases the role of employees around the value stream. In other words, the role of people is based around the flow of value through the end-to-end process. This approach requires a cross-functional team, able to work together as skilled problem solvers delivering the day-to-day requirements of the business while also engaging in the important improvement imperatives. What unifies these actions can be in some cases a single physical product and it's delivery to the customer and the predictability of that requirement. Often this is not the case in the service environment.

By comparing the organisational structure of Service and Manufacturing organisation we realized that:

Structural characteristics	Service	Manufacturing
1. Separate boundary roles	Few	Many
2. Geographical dispersion	Much	Little
3. Decision making	Decentralized	Centralized
4. Formalization	Lower	Higher
Human Resources		
1. Employee skill level	Higher	Lower
2. Skill emphasis	Interpersonal	Technical

Table 1.2 Configuration and structural Characteristics of Service organisations versus Product organisations (Daft, 2007)

Boundary rules are used in manufacturing system to handle the extent of variation and to control the technical part of production. It is a different scenario in Service. As the service is intangible and cannot be passed easily to the customer within boundaries. That's why the service customers must interact directly with skilled employees. According to Northcraft, (1985) these employees need sufficient knowledge and awareness to handle customers' problem, i.e. social and interpersonal skills as well as technical skills. This skills level would suggest decentralised decision making policy as appropriate to the service industry, leading to lower formalisation. However, as literature has shown in most service industry because of their organisational structure the greater proportion of authorisation stays with top level

employee in the hierarchy. From the other aspects, in manufacturing decision making is more centralised with higher formalisation. Toyota has already worked on the learning elements and answered to this matter by making a cross-functional team, even though its organisation is a manufacturing organisation.

4. Conclusion

The differentiation-integration approach is based on the fundamental viewpoint that organisations must be designed with environmental demands (Gibson L, 2009). If we go further it can be recognised that different organisation designs can and often do exist within a single organisation. For instance a manufacturing organisation may find it beneficial to design the manufacturing department differently from its research department. The differences in design are due to the differences each department confronts. The challenges established organisation with several business units go through are different from those of say a relatively young organisation with 10-50 employees and size can play an important role as much as the organisational structure.

Every organisation must create organisation structures that align well to its mission and strategies (Jugulum, 2008). From a Lean perspective the organisation must work towards the value specified by customer – with organisation structure aligned to the way in which value is added. And to have structures which can accommodate characteristics such as;

- **Being Flexible:** Lean comes with continuous improvement and change will be a constant challenge. The flexibility enables successful exploration, risk taking and entrepreneurial work. The structure needs to be flexible in order to prevent, detect, and analyse the problems.
- **Able to work cross-functionally:** information and product needs to flow in an organisation, in order to do that the departments within the organisation need to communicate with each other and work across functions. Management support and feedback loop will facilitate this required characteristic.

While not suggesting the structure of any organisation, which tries to apply Lean, should be the same as that of the Toyota organisation it is likely that the existing organisational structure, management responsibilities and lines of communication will need to change in order to accommodate this fully. Many of the benefits of implementing Lean in the service sector described in literature are as a result of improving within existing structures not as a result of radical reform of these within a particular organisation. In the manufacturing industry these structures are well known and can be designed in however, in the service sector these are only just emerging as organisations seek to implement Lean practice.

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TECHNIQUES FOR MANAGING GRADE PREDICTIONS FOR SECONDARY SCHOOL PUPILS IN ENGLAND

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Abstract

The purpose of this work is to investigate the implementation of process improvement techniques in secondary education. Success from the application of these originally industrial techniques has been demonstrated in a number of service areas, but limited research is available of their application within the secondary education system.

The main objective was to assess which of the tools and techniques commonly associated with lean and six sigma management techniques were already in practice at schools. Following on from this, further assessment was undertaken to understand if there was scope for new developments.

The two schools selected are of a comparable size and serving a similar community although one school is an all-girls school and the other mixed. Both schools were awarded a Grade 2 in a recent Ofsted inspection¹⁵. In a pre-meeting the Heads of each school agreed the area of focus for the analysis. A high-level process mapping technique, SIPOC (Supplier, Input, Process Output, Customer) was used to engage discussion between staff and map the current processes. Semi structured interviews were also used to provide further detailed understanding behind the maps. Secondary quantitative data from both schools was collected to provide some objective data against the perceptions of staff.

The SIPOC analysis focused on the grade prediction work stream and notably there was little standardisation between schools or indeed within schools, of the method employed to predict students grades. It was evident in both schools that the predictions were not always accurate and not all predictions were made in a timely fashion by staff. There was some evidence of an ad-hoc approach to utilisation of process management techniques and for one of the participating schools there was clear use of visual management techniques for both managing and tracking data. Visual management was also used for directly adding value to the learning experience for both pastoral and academic service.

Areas identified that currently do not follow lean practice included; non-standardised processes, repeated mistakes, interruptions, batching of work, workplace organisation, customer specific outputs, knowledge management and visual management. Opportunities for implementation of process improvement techniques such as lean and/or six sigma were identified and successful implementation would give great and measurable benefit to the schools, not only freeing up resources within the schools but also directly assisting the teacher's role in supporting the pupils.

Keywords: research, management, lean, process improvement, performance measurement, service design

¹⁵ An inspection report provides information about the effectiveness of the provider's work, tells you what the provider does well, and contains recommendations about what the provider should do to improve further

Purpose

Education is an integrated part of society which is responsible for the development of students, who will be the future society's experts and leaders. State schools in the UK operate within tight financial constraints, handling of the cost/price relations, time and quality of education provided is of even greater importance.

Process improvement techniques have contributed to improvements in a widespread area including both private and public sectors. Despite this widespread application there is little published research on process improvement in Secondary Education.

The purpose for this work is to investigate the implementation of process improvement techniques in secondary education.

2. Background to Process Improvement

Process improvement originated from the work carried out initially by Shewart in the 1930s to give a scientific underpinning to the approach taken to making improvements to processes. Shewart, Deming and many others since have found that 85% of the time, lack of quality is built into the processes and only 15% of the time are problems due to individual employees [1]. The Japanese manufacturer, Toyota, led by the plant manager, Taiichi Ohno, built on the concepts developed by Deming of examining processes for resolving quality problems. They spent forty years developing a high quality production process to remove waste from the processes at the Toyota manufacturing plant [2]. After an observation of Toyota's successful manufacturing line the term "Lean" was coined by James Womack and Daniel Jones in their book, *The Machine that changed the world*. American and European manufacturing companies have chosen to use the name "Lean" when referring to the concepts used in Toyota Manufacturing System (TPS) [3].

Studies have shown that lean plants tend to have a "two to one" performance advantage over conventionally organized plants [4], [5], [6], [7]. With this success the methodologies were captured and applied to other areas of the business, across supply chains and to other sectors.

Bowen and Youngdahl [8], Spears [9] Collins and Muthusamy [10], Chase and Stewart[11], Dahlgaard and Ostergaard [12] are among the authors that have reported that the lean methodologies, that have been successfully used in manufacturing, can be transferred to non-manufacturing contexts such as restaurants, hotels, education, administrative companies, hospitals and health-care firms, among others in order to achieve similar improvements. Although it is difficult to identify a clear physical product from non-manufacturing sectors there are still repetitive activities that instead generate a tangible or an intangible output i.e. information, knowledge, care etc that drive customer value and loyalty. Effectively the processes that produce these outputs become the production system (similar to that of a manufacturing unit) of a service organisation that produces some output of value to the customer from inputs supplied by various sources.

Studies conducted by Comm and Mathaisel [13], Emiliani [14], Moore et.al [15] and Chung Sea Law [16] have highlighted the positive benefits of applying Lean and six sigma techniques in the higher education sector. Blazer [17] says that by eliminating unnecessary steps and activities that adds no value to the university saves resources, and allows for the redesign of work making it more meaningful and satisfying for the employees. Looking at improving the processes in higher education, helps in providing students with better education quality at reduced costs at the same time providing greater ownership of the work to the employees. Although there are some published studies in the Higher Education sector, none were identified from secondary education.

3. Aims

The primary aim of this work was to evaluate whether process improvement could directly improve the educational outcomes for pupils. The secondary aim was to use lean and six sigma techniques to help prioritise administrative opportunities.

In order to achieve this aim the following four objectives were set,

- Identify and assess any techniques already in use
- Identify the benefits of utilising the techniques
- Draw attention to customers, suppliers, value adding and non-value adding and essential non-value adding (ENVA) activities within school processes.
- Trigger the use of any techniques that could be appropriately used.

4. Method

Two schools took part in the study, referred to as School A and School B. The study took place over a four week period in the third quarter of 2010.

School A has 1063 secondary school pupils plus 182 sixth form pupils. It serves an inner-city catchment area. The school is over subscribed, with significant numbers of students who travel from outside the catchment area [18]. Based on Ofsted inspection reports, with respect to overall effectiveness and its capacity for sustained improvements the school is a grade 2 – good.

Grade predictions were identified as prioritise through initial interviews by the head teachers of both the schools.

Semi-structured interviews were used to capture rich data from key members of staff from both schools, including the head teacher, deputy head, various front line teachers, SIMS manager, head of year 11. This technique allows both the process followed to be identified by the actors of the process as well as giving opportunity to understand reasons behind practice. In addition to this regular phonecalls and emails with the Deputy Head Teacher took place.

The SIPOC (Supplier/Inputs/Process/Outputs/Customers) technique was used to better understand the process identified. This technique requires participation on those involved in delivering the process to first, define the process then consider the outputs and customers of the process and finally to consider the inputs and the suppliers to the process. The activity was run using a sheet of brown paper on the wall with the headings of a SIPOC diagram and staff were asked to fill in the details on Post-It notes and place them under the appropriate headings. The process was returned to at the end of the activity to flesh out in much greater detail at the heart of the diagram.

The SIPOC diagram can be further built on to identify and capture the process owner, the key performance indicators, the source of data, the measurement method and goal of the process.

The initial SIPOC diagrams were sent back to the teachers involved for verifications and amendments made where necessary. Further interviews took place to create a detailed process map and to give explanation behind activities and ordering.

The SIPOC diagrams were used to review the activities as value adding, non-value adding and essential non-value adding. A timeline of events was used to assess which activities took up the most time.

The results were compared between the schools to look at what is done differently and why. They were analysed against some of the main building blocks of the lean principles for process improvement such as standardisation, quality and consistency.

5. DATA gathering

The Fischer Family Trust provides schools and Local Authorities with a range of online reports to support target setting and self-evaluation. Previously a national assessment framework had assessed secondary school children; this was abolished in England in 2009 [19]. As a result, schools are having to determine and formalise their own grade assessment and tracking system for their pupils.

Within the school, there is a process of tracking the academic progress of a pupil. This data is used to give aid to students not achieving their target grades, as set by Fischer Family Trust, and is also used

to produce reports for parents and local authorities. A separate SIPOC diagram mapped the process of the academic progress of the pupils,

5.1 School A

Within School A there is a process of intervening with pupils not achieving their target grade set by the Fischer Family Trust.

It was found that there are two different processes involved in tracking a pupil's academic progress. The first relates to Key Stage 3 (KS3), whilst the second relates to Key Stage 4 (KS4). See Fig.1 Academic Progress and Intervention SIPOC for School A, below, was mapped. A report was created explaining each process in detail.

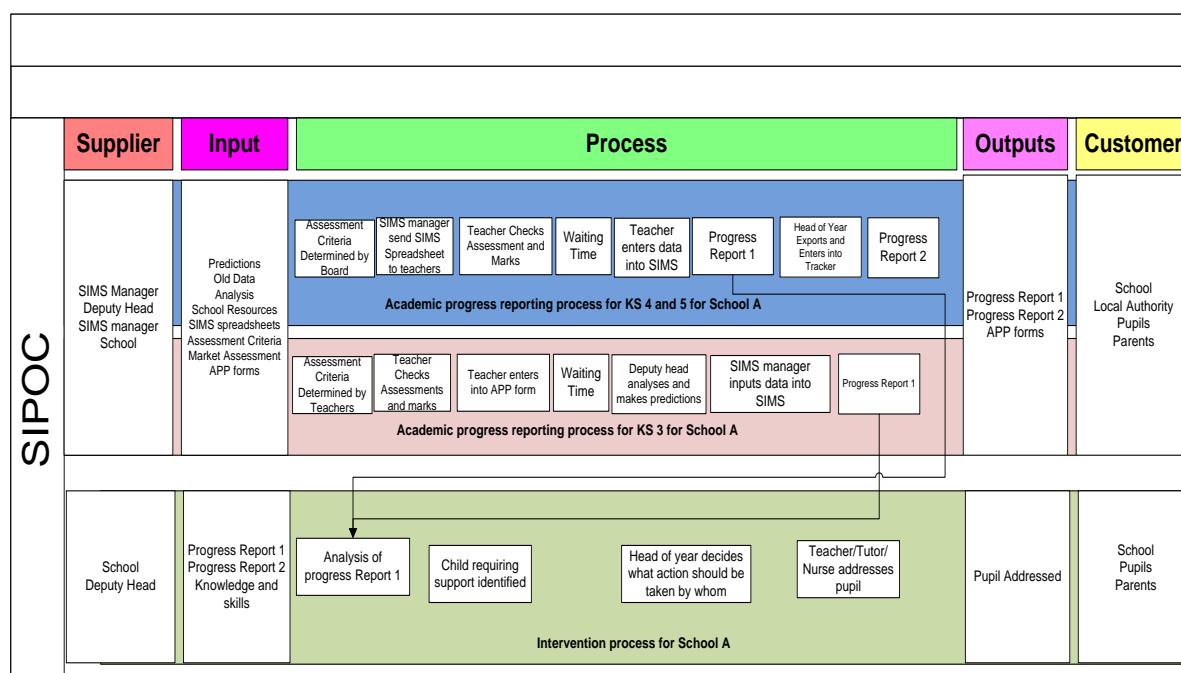


Figure 1- Academic Progress and Intervention SIPOC for School A

5.1.1 Key Stage 3

The teacher sets the assessment criteria and appropriate assessments. The results for each pupil is recorded in a standard form which acts as a gap analysis of knowledge on the particular subject. This information is passed to the Deputy Head initially for validation of accuracy and then to formulate predictions. The predictions are input into the SIMS (Schools Information Management System) database, a schools information management system offered by Capita [20], database by the SIMS manager and a progress report is created which can be accessed by the teachers on the shared network and also allowing the Deputy Head to identify which pupils require additional support. The timely input of the initial data is essential for this system to work effectively, but unfortunately the teachers often miss the deadline. This causes delays and additional work for the deputy head in progressing and expediting the information.

5.1.2 Key Stage 4

The assessment criteria are determined by the exam boards (e.g. AQA, Edexcel, OCR) which guide the teacher in setting the appropriate assessments. The SIMS manager creates a SIMS spreadsheet containing the appropriate sections for that report. The interim report, done twice a year, would ask for predictions of GCSE grades and attitude towards work for each pupil. This is marked with a number rating system. The full report, done once a year, would contain both of these but also has a selection of comments for the teacher to select the most appropriate to describe the pupil. The SIMS manager declares the SIMS spreadsheet open for a certain year group (at no given point will a teacher be inputting for more than one year group). There is a two week period where the teacher is required to input the predictions into SIMS before it is closed. However, it was observed that between five to ten teachers would miss this deadline by up to a period of two weeks. The SIMS manager spends this

time finding and addressing teachers who have still to input data. For three weeks in a year the Deputy Head spends 30% of her working time applying further pressure to teachers who do not respond to the SIMS manager. If the teachers have trouble with SIMS, their written predictions are given to the SIMS manager who spends an hour a week when required inputting their data. Once the data is obtained an initial progress report is produced. This is used for school parent reports. The Head of Year then imports the initial progress report into a spreadsheet (CVA Tracker) to identify which pupils need to be addressed.

5.1.3 Intervention Process

The deputy head spends two weeks outside her teaching hours analysing the key stage 3 progress reports. The head of year 11 analyses the key stage 4 report also requiring two weeks of their time. This allows them to identify which pupils are not progressing towards their predicted targets, as determined by Fischer Family Trust. This information is utilised by the head of year who decides what should be done with the pupil and who should deal with them. The pupil's information is passed onto the relevant subject teacher who then addresses the pupil.

5.2 School B

The same process was followed with School B and Fig. 2 Academic Process and Intervention SIPOC was created, Again a report was created explaining each process in detail and fed back to the stakeholders.

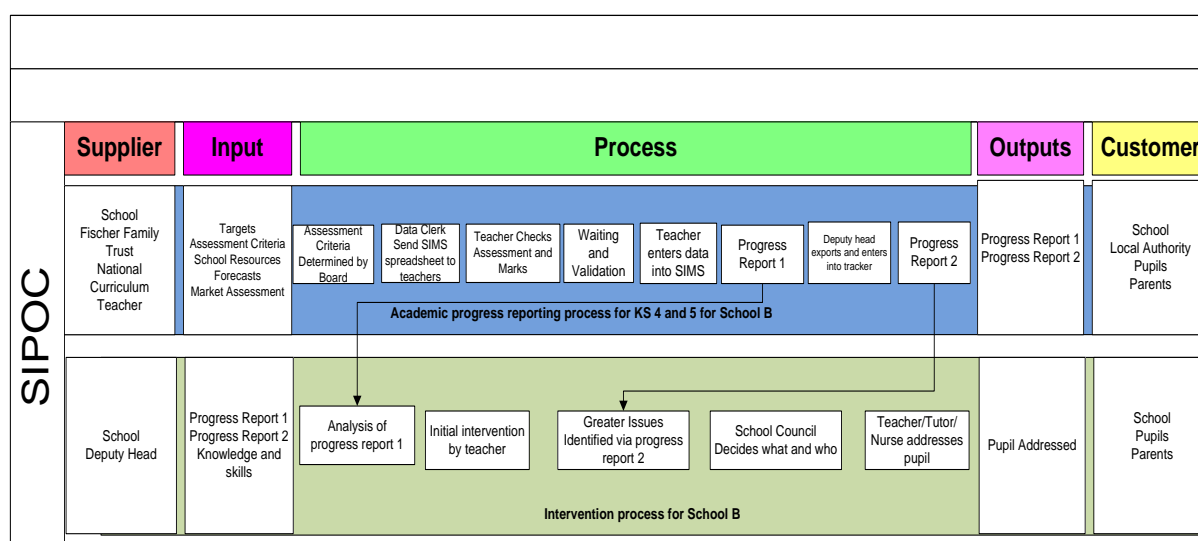


Figure 2 Academic Progress and Intervention SIPOC for School B

5.2.1 Academic Progress Process

The assessment criteria are determined by the exam boards (AQA, OCR, Edexcel etc.) which guide the teacher in setting the appropriate assessments. The teacher marks assessments and inputs the predicted grade for that level (e.g. GCSE.) into SIMS within a two week deadline; this needs to be done three times a year. It is observed that five to ten teachers miss these deadlines by up to two weeks. This time is spent waiting for teachers who do not meet the deadline. In addition to this, two weeks are spent by the deputy head validating the data. SIMS produces progress Report 1. This is sent to the parents. The Deputy Head exports the data into a spreadsheet which the teachers have access to for initial intervention. Progress Report 2 is produced. This is used to produce reports for the local authorities and to further investigate pupils for intervention.

5.2.2 Intervention Process

Pupils that require greater intervention are identified using Progress Report 2, which is a colour coded spreadsheet. This will trigger initially that the subject teacher or form tutor will address the pupil. For

more complex issues, the school council decides what support package is most suitable for the pupil or group of pupils.

5.2.3 Forecast VS Actual VS Target

As mentioned above, the academic progress of a pupil is mapped by looking at their forecasted results for their upcoming exams. The accuracy of this data is important to aid the pupils, the teachers, the school and the local authorities. Nearly 50% of grade predictions of grades of A* to C were either predicted as too high or too low. By representing the figures of forecasts and actual results in a series of graphs, it makes it easier to assess which subjects forecast too high, too low, and by how much of a degree. With access to past years data it would be possible to chart whether any subject is consistently forecasting inaccurately.

The teachers were unsure as to whether they should enter predictions or actual results into SIMS. The deputy head made it clear that, apart from once a year, the teachers should only be inputting predictions.

5.2.4 Visual Pupil Support Management Tool

The deputy head had pictures of all his Year 11 pupils up on a wall in his office as in Fig. 3 Pupil Support Visual Management Tool below. Behind him were pictures of pupils predicted to do well and achieve their targets in their GCSE's. He placed green stickers next to each pupil picture. However to his left in his direct view were pupils who required the most attention. Coloured stickers are used to signify whether the pupil is having trouble with maths, english, and/or attendance. This allowed him to monitor the pupil's progress and identify those that needed more help than others.



Figure 3 Pupil Support Visual Management Tool

6. Data Analysis

6.1 Frequency of use of data

In both schools, progress reports for pupil intervention are produced from the collected data. However, these reports differed slightly in structure and are also created and used at different times of the year between the two schools. These reports included general school reports, parent reports and spreadsheets for tracking the progress of a pupil.

Twice a year an interim report is created for each pupil of both schools and once a year a full report is created. This happens for each pupil year group with a week in between each report deadline. A copy of each report for an individual pupil is sent to their parents.

The teachers can access the academic progress data whenever they wish via the shared network but also expressed the use of their own information. The teacher is a vital part in the intervention of the child and is an important customer of the information from these reports.

The school also used these reports to generate general information on the school's performance, which is then used by the local council to monitor the performance of the school on factors such as

achievement of top 25% of the pupils, performance in relation to similar schools in the area and performance in relation to schools in the nation.

School B also creates one report each term for each year group. The SIMS produced report is sent to the parents containing the information of target grades and predicted grades.

The data from SIMS is then used by the deputy head of year to create simpler spreadsheet that the teachers have continuous access to, this is what is termed as rework and is a form of waste, typically this can be about 60% of the time taken up for the process. The spreadsheet has a traffic light system to flag up pupils who are not achieving their academic targets.

6.2 Accuracy and timeliness

From discussions with the school authorities it was found that the data collection and analysis for pupil intervention was a major value adding activity of the schools operations. However, the major concerns for the flow of the process were identified as the deadline in which the teachers would return desired data and accuracy of data with respect to forecast and predictions. 30% of the Deputy Head's time, outside teaching hours, for three months a year, was spent waiting for the data to be submitted, validating the accuracy of this data and chasing up teachers who haven't submitted the data.

There is no standardisation and this could affect the timeliness and accuracy of data. It was observed that there was a difference in data gathering methods between KS3 and KS4 in School A. In addition to this, both schools had the same objective but also used different methods of data collection.

6.3 Skills required by teaching staff to use data management software

In School A and School B the IT skills of the teachers were varied. This had an impact on how effective the teachers were in their use of SIMS, including the time taken to input data into SIMS. Teachers with better IT skills found SIMS easy to use and manipulate which meant they were more likely to input data accurately and on time.

The teachers in School A were unanimous in the opinion that the SIMS programme was quite slow, took a long time to load and at times would not work. The problems included difficulty in saving completed forms, the need for multiple steps to complete one entry and also a lack of understanding of the correct data to fill into each form. The teachers expressed a desire to use their own systems or spreadsheets to track academic data.

In School B, however, most teachers found SIMS easy to use. This could either be an effect of having more training and practise using SIMS or that the IT infrastructure better supports SIMS and the teachers realises the effectiveness of SIMS. There is a desire to progress their use of SIMS. Some commented that a downside of the software was the fact that data could not be manipulated. Often teachers would have to export data from SIMS to a spreadsheet in order to rework the data. Others expressed that it would be useful to have spreadsheets within SIMS to be active for a month instead of two weeks. Others expressed a desire to have previous year's data kept alive in order to aid analysis of a pupil's progress.

In both schools, there is a SIMS manager and a technical team to help the teachers with any problems they face using SIMS or any issues relating to IT. However getting this support takes time out of the teacher's schedule. The school provides training for SIMS out of school hours but often teachers do not attend.

6.4 Flow and balanced work

In School A, the flow of data for the KS3 is from all the teachers to the deputy head. Effectively the deputy head becomes the bottle neck as information from different sources flow into one person. This may create unbalanced work and a much slower process flow as one person is checking, analysing and predicting the data. The benefit of having a single person carrying out these activities is that it may ensure the accuracy of data is maintained.

This situation contrasts with School B where all the teachers are responsible for making predictions and inputting data into SIMS. The accuracy of data is checked by the deputy head after the data is put into SIMS. The teachers have responsibility and own the process. Work is balanced throughout the network of teachers.

6.5 Customer requirements capture – usefulness and useability

In both School A and School B, some teachers feel that the progress report is neither comprehensive nor as clear as it could be. Three of the six teachers expressed concern that the parents cannot fully understand what the report indicates and there is no way to find the information. These teachers could not see the significance in inputting the data as they believe that the parent receives little valuable information. In both schools, only once a year the teachers have an option to write comments into a report.

In School A, the teachers have a selection of standard comments to choose from when producing a report for the parents. The comments cannot be modified and some felt this to be quite restrictive and impersonal. In contrast, the teachers in School B had more freedom. However it is still not clear who the priority customer is, how much information the school wishes them to have, and what use that information is.

The question here is what the priorities of the school are. If parents are quite high on the list, it should be considered whether they prefer written comments. If the teacher's time with the pupils is more important, it is not practicable to spend an excessive amount of time reassuring the parents.

6.6 Knowledge management

In School A, it is recognised that all the knowledge/data flowed from the teachers to the deputy head. This knowledge is then managed by that one person. It means that it is more difficult for any other person to pick up the job should the person in charge ever leave the school.

In School B, all the data flows from the teachers into the SIMS system which is accessible by all the teachers. This knowledge is managed by all the teachers instead of just one person.

6.7 Visual Management

Evidence of visual management techniques were found in both schools. In School A the colour coded timetable provided information showing when different reports needed to be completed by. It was also found that one teacher used a simple chart to track the progress of pupils, revealing how far they were from the next grade. The whole group would see this every lesson. The teacher expressed that his had been successful.

The year 11 teacher spends days analysing all the data from the progress reports from a large spreadsheet.

In School B visual management techniques were found in front line activities. The visual pupil management method was used by the Deputy Head to identify the pupils which required the most attention. The tracker that the Deputy Head and the teachers use is colour coded red and green so the pupils who need extra attention are easily identifiable. This was regarded as successful and already further work is being done to colour code reports.

7. discussion

Techniques emerging from business recognize that a good business is nothing more than a set of lean, well run processes. A process re-designed from the 'outside in' based on customer, or in this case pupil/parent, feedback will work far more efficiently than a process re-designed from the 'inside out' or from the teachers view.

Thinking about the organisation as a set of well run processes shifts understanding of resources to inputs to the process, allows clarity of the connection between these inputs to the outputs. The linkage between outputs to outcomes and meeting the goals of the organisation is explicit, all highlights that all the rest is expensive non-value adding luxury. Typically in work within the public sector when classifying activities 5% of time is spent on value adding activities and 60% of time is spent on non value adding activities; 35% of time is spent on essential non value adding activities due to laws of legislation. When processes are analysed to a quantifiable level of detail the associated costs can be calculated of staff time on non value adding activities and substantial opportunities for saving in both time and cost can be identified. This will bring direct benefit to the complex set of customers the school has, pupils and parents, staff, organisation, local authorities of Trust boards and local community.

Useful to mention ENVA (essential non value adding activity) 35% this is due to law or legislation and has to be completed but adds no customer value

Schools are at an advantage to many within the public sector as already have systems to capture data and have a culture that, although reluctantly, accepts that this data gathering is part of their role. Using this data to drive improvements is where the opportunity lies. Daily monitor of activity and tracking performance enables continuous improvement to processes rather than a typical 'improve then plateau' model

Lean puts the activity at the right level of the organisation allowing people to feel valued and improve morale. Decisions need to be at the right place within the school and the tools and techniques associated with lean allows this.

Standardisation of process and people would ensure that energy is expended in creativity within the classroom, where direct value adding activity takes place, and not on supporting data tracking processes. It would also mean that cover and sharing workload is much more manageable.

Excellent implementation of lean means a whole systems approach needs to consider with full end-to-end analysis. The analysis is data driven not anecdotal and, when captured, allows benchmarking for other and a platform for good practice to spread.

School B recognised the value of mapping immediately and further investigation took place into their exam procedure. Positive feedback from the research was prompt as after the initial SIPOC the school recognised the problem of unnecessary workload and has already looked into delegation of unskilled administrative tasks.

To ensure effective implementation effective leadership is critical characterised by a 'Go See' approach of those in leadership positions across and down the organisation.

8. Conclusion

The purpose of this work was to explore the implementation of process improvement techniques in two schools. Both schools initially asked us to consider the process of tracking the academic progress of pupils. Visual management techniques can and already are in use to improve the efficiency of analysing the data. The visual mapping associated with the SIPOC process was also found to be beneficial to develop organisational understanding of the processes. There is an opportunity to apply process improvement techniques such as standardisation and project management. This could limit variability of results and improve timeliness. The exercises and analysis that were carried out brought attention to the value of the outputs and the customers of the process. This includes the desires of teachers and parents, needs of the pupils and requests from local authorities. There were areas where techniques similar to Lean were already effectively implemented. There is opportunity for the techniques to be implemented in further areas in the school. The biggest challenge is assuring the staff that change can happen.

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Appendix 25 *Ethics forms*